RAILROAD GAZETTE

FRIDAY, JUNE 5, 1903.

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Contributions

Saratoga Conventions Passes.

Albany, N. Y., June 1, 1903.

TO THE EDITOR OF THE RAILROAD GAZETTE:

The impression appears to have got abroad that the D. & H. Co. is furnishing transportation to all members of the Master Mechanics' and Master Car Builders' Associations, irrespective of whether they are active railroad men or not. I should appreciate it very much if you would insert an item in your paper to the effect that we will furnish transportation to all active railroad men who are members of the associations on application from the properly authorized official of their road.

This will save us a good deal of unnecessary correspondence and unpleasant refusals to furnish transportation.

J. R. SLACK,
Superintendent of Motive Power.

Sleeping-Car Fares in England.

Cleveland, Ohio, May 26, 1903.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In your paper of May 22 in the article entitled "Some New English and Continental Passenger Cars" you give a quite wrong impression, and one that is unjust to American Railroads, when you say, "The longest trip with this car [London & North Western sleeper] is only about 14 hours and the charge for any distance is only about five shillings more than the ordinary first-class fare. . . . This is no doubt owing to the fact that the cars are operated by the company and not by an outside corporation." You are saying this about the sleeping cars between London and Edinburg and London and Glasgow over the London & North Western. A casual reader would naturally think that all it costs to occupy a berth in the compartment car was $1.25, or 5 shillings. Now, then, here is where the joker comes in.

You can take any of the afternoon expresses from London, either to Glasgow or Edinburg, third-class, at a round trip price of a little over $13 if memory serves me right, the distance, round trip, being 800 miles. The fare, you see, is really very cheap. You ride in as fine a car as you could ask for. But suppose that after you arrive in Glasgow some other sudden call requires that you come back by night, to save time. You go to buy your berth ticket (so very cheap, only $1.25) but you find that you cannot return on the third-class ticket (the return portion of that ticket that took you up in such fine shape on the day train), but have to get a first-class ticket, costing over $13, one way, before you can avail yourself of the sleeping car accommodations. So, when you have arrived in London, and figure up your expenses, you find that it cost you about $8 to use that sleeping car one night.

Your statement that this 5 shillings is in addition to ordinary first-class fare is exactly right. You cannot use any other kind of ticket in the sleeping car, whereas, as I have said, a third-class luncheon-car between those two points by daylight is as fine an accommodation as anybody can ever want. It is the same way between Paris and Vienna on the celebrated Orient express. You have to occupy the sleeping car 24 hours in each direction and it costs 80 francs, or $16, above the price of the round-trip ticket.

The idea that it is cheaper to ride on European roads than it is to ride in America is all humbug, when accommodations are taken into consideration. The moment the accommodations begin to approach in quality the kind furnished in our country, the price goes up like a balloon.

A. H. CARPENTER.

Chicago Great Western Momentum Grade Diagrams.

St. Paul, Minn., May 14, 1903.

TO THE EDITOR OF THE RAILROAD GAZETTE:

The following is a brief explanation of the formula and diagram which we are now using on the Chicago Great Western as an aid in our grade revision work. The basis of the formula is the following simple proposition $W(h_i + h_g) + D \times T - W \times C = W \times 0.0355\ V^2$.

Where W = weight of engine and train in tons.
D = distance run by train.
T = net tractive power of engine in tons.
V = velocity in miles per hour at the end of distance D.
h_i = initial velocity head.
h_g = gravity head (+ for descending and — for ascending grade).
C = frictional resistance per unit weight of train (tons per ton).

The net tractive power will vary with the available steam pressure in the cylinders which will in turn vary with the speed of the engine. Making the ratio of available cylinder pressure to boiler pressure ordinates and the velocity V abscissa — the net cylinder pressure is represented by a curve of the following form (Fig. 1), in which, however, the part between V = 10 and V = 30 approximates closely to a straight line of the equation y=0.95—0.0175 V for our class 200 engine. The work performed by the engine moving the train a distance D will, therefore, be $= D \times T\ (0.95 - 0.0175\ V_1)$ where V_1 = mean velocity during the movement $= \frac{V + \sqrt{\frac{h}{0.0355}}}{2}$ The second term in the formula can be written $= D\ T\ (0.95 - 0.00875\ (V + \frac{\sqrt{h_i}}{0.0355}))$

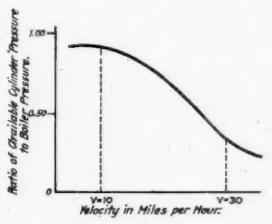


Fig. 1.

For the frictional resistance of the train the values given by Mr. Searles's formula have been used. Solving the equation we get $V = -\frac{a}{2} \pm \sqrt{b + \frac{a^2}{4}}$

where $a = \frac{D\left(\frac{0.875\ T}{W} + 0.00159\ \sqrt{h_i}\right)}{0.0355 + 0.00015\ D}$ (D in stations of 100 ft.)

$$b = \frac{h_i + h_g + D\left(\frac{T}{W}(0.95 - 4.65\sqrt{h_i}) - 0.00423 h_i - 0.241\right)}{0.0355 + 0.00015\ D.}$$

For our class 200 engine (136 tons) and a trainload of 1,200 tons exclusive of engine and caboose, a and b reduces as follows:

$$a = \frac{D\,(0.01148 + 0.00159\ \sqrt{h_i})}{0.03.5 + 0.00015\ D}$$

$$b = \frac{h_i + h_g + D\,(1.0064 - 0.061\ \sqrt{h_i} - 0.00423\ h_i}{0.0355 + 0.00015\ D.}$$

The curves (Fig. 2) have been plotted for the above mentioned class 200 engine weighing 136 tons (including tender) and a trainload of 1,500 tons exclusive of engine and caboose, and are used as follows. The elevations of the center of gravity of the train at points 10 stations apart are first tabulated, and the gravity head (hg) determined commencing at station 1,100 on the profile (Fig. 3) and assuming at that point an initial velocity of 28 miles an hour, as shown by the following table. On the diagram for a trainload of 1,500 tons, follow the vertical from V = 28 to the intersection with the curve of initial velocity head, and from that point horizontally to the intersection with hg = — 2.5 corresponding to V = 25.8, which will be the velocity at station 1,110. Repeating this process in successive steps as indicated by the broken line on the diagram will give the train velocities marked on the profile at each tenth station.

Station.	Elevation.	Difference in ft.	Correction for curvature.*	Gravity head Hg.	Velocity head miles per hour.
1100	430.0	.....	....	.....	28.0
10	432.5	— 2.5	....	— 2.5	25.8
20	438.0	— 5.5	— 1.1	— 6.6	21.9
30	448.0	— 10.0	— 1.4	— 11.4	15.0
40	456.0	— 8.0	....	— 8.0	11.1
50	457.5	— 1.5	....	— 1.5	14.3
60	457.0	+ 0.5	....	+ 0.5	17.7
70	461.5	— 4.5	— 0.6	— 5.1	15.8
80	468.0	— 6.5	— 1.0	— 7.5	12.2
90	469.0	— 1.0	....	— 1.0	15.3
1200	463.8	+ 5.2	....	+ 5.2	21.1

*Compensated at the rate of 0.05 ft. per degree of curvature.

The formula presupposes that the engine is using full steam, and also that the steam pressure is kept up at all times. Neither of these suppositions are true, of course, and the diagram must be used with some judgment.

A. MUNSTER.

Electricity in Railroad Shops.

The following additional letters have been received since the publication of the symposium on the above subject in the *Railroad Gazette* of May 29.

FROM MR. R. D. HAWKINS, MECHANICAL ENGINEER OF THE GREAT NORTHERN.

In selecting proper drives for our new shops at St. Paul, at our western shops at Havre, Delta and Spokane, I took up the matter of individual and group motor drives, and decided to install group drives rather than individual drives, unless a machine required more than about 7½ h.p. and was to be run intermittently. The results at the western shops show quite a saving for the electric drives. We attribute a large part of this saving to the decreased friction of line shafting, for in a long shop of wooden construction, it is quite an art to keep all the shafting lined up properly. On short groups this can be more easily accomplished, besides there are certain sections in repair shops where the machines in the groups are not running continuously. This is particularly true where several large planers are grouped as the motor can be shut off while work is being put in place and set on the planer bed. There are other machines which can be picked out, which do not run continuously. Of

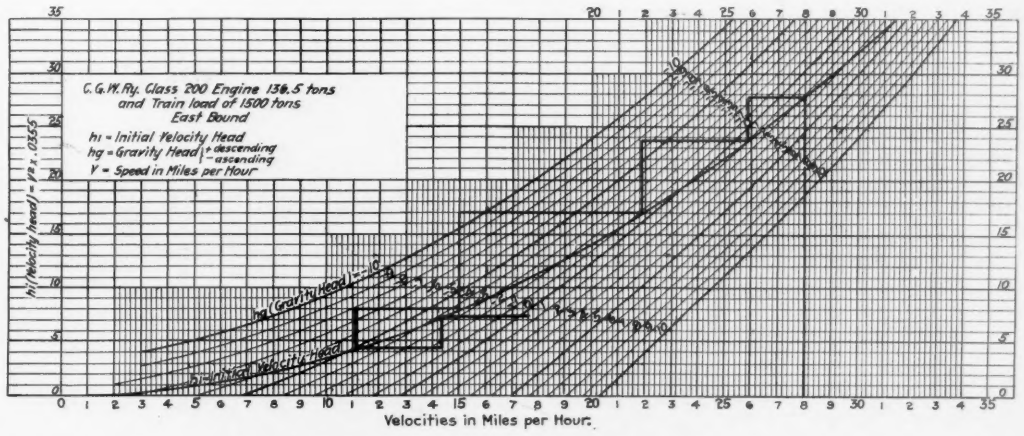

C.G.W. Ry. Class 200 Engine 136.5 tons and Train load of 1500 tons East Bound
hi = Initial Velocity Head
hg = Gravity Head (+ descending — ascending)
V = Speed in Miles per Hour
hi (Velocity Head) = V² x .0355
Velocities in Miles per Hour.

Fig. 2.—Momentum Grade Diagram—Chicago Great Western.

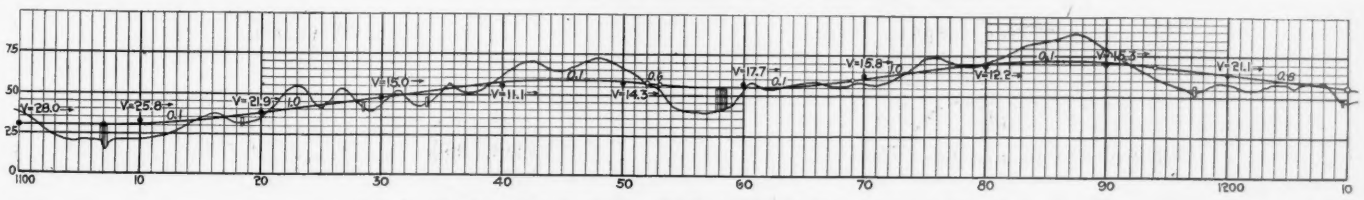


Fig. 3.—Profile of Road Used as Basis for Calculating Curves in Fig. 2.

course, in the modern shop the wheel and tire machinery are run nearly all the time.

In regard to the strength of the machine tools not being up to date or not being as strong or heavy as required for the present tool steel, I agree with you that we have a great many old tools in our shops which are too weak and which cannot stand the strain which could be given them when using the best grade of modern steel. I find that the new tools which we have received have been strengthened considerably, but we have been unable to reach the limit of the best self-hardening steels, on account of the vibration of the machines.

Our experience with electrically driven repair shops warrants me to say that the application of the electric motor, especially where shops are remotely located from each other, institutes quite a saving, especially on account of being able to put up a modern and economical isolated power house and get less transmission losses.

FROM MR. W. RENSHAW, SUPERINTENDENT OF MACHINERY OF THE ILLINOIS CENTRAL.

It would be advantageous in large shops to operate large machine tools with independent motors, and to group the smaller tools into units not less than 25 h.p. It would be quite expensive to do this by remodeling an old shop, and, therefore, it is a question if it would be economical, particularly where old machines are already in use.

I think the matter is well worthy of consideration, however, in the equipment of new plants where the first cost of shafting and belting could be dispensed with.

The Hall Electro Gas Signal.

Hall semaphore signals worked by gas motors are now in use on a number of important railroads, and the orders which have been received by the Hall Company for signals of this kind, filled and being filled, aggregate 1,100 blades. The apparatus for working the signal, which has already been briefly described in these columns, is shown in detail in Figs. 1, 2 and 3. Fig. 1 is a perspective view of the double gas mechanism for working a home and a distant signal on the same post. The lower ends of the rods which connect with the signal arms appear at the top of the engraving. The power is applied through the vertical cylinders. These cylinders are movable, being rigidly attached to the signal rods, while the piston is fixed to the base of the frame. The gas, entering through the piston, forces the cylinder upward, clearing the signal. Fifty pounds of liquid carbonic acid gas is stored in a tank about 4 ft. long and 8½ in. outside diameter, which is kept in a well at the foot of the post. The well will hold two tanks. On the top of the tank is a valve with a connection leading to the reducing valve, where the pressure is reduced from 800 lbs. per sq. in. to about 40 lbs. The valve on the top of the tank has a safety valve which will blow off at a pressure of 2,400 lbs. The tanks are tested to 3,700 lbs. This great strength is required because of possible temperature changes, the pressure increasing with a rising temperature. If the tanks were left in a hot sun a sufficient time the pressure might increase to the blowing off point.

The admission of the gas to the working cylinders is controlled by a valve which is opened and closed by the armature of an electro magnet. In the engraving the magnets for the distant and the home signals are seen at the left and the right respectively. In automatic block signaling these magnets are energized in the usual way by a local circuit controlled by the relay of the track circuit. When a signal has been cleared it is held in the clear position by a series of levers and latches which will be presently described. Suitable circuit closers or electric switches are provided to insure the operation of the two signals in proper sequence, the distant to be cleared after the home signal has been cleared.

The construction of the mechanism is shown in Fig. 2, consisting of front and side elevations and a section through the line A B of the front elevation. In referring to this drawing the general number (19) will be omitted, 19.00 being referred to as 00. In this drawing 01 is the frame, 00 the cylinder and piston complete, and 29 the pedestal supporting the piston, through which the supply pipes 80 and 81 pass from the valve to the cylinder.

Pipe 79 leads from the reducing valve 31 to the expansion chamber, and from there to the electrically controlled valves 100. Pipe 82 connects the supply tank to the reducing valve. The armatures 12 operate the valves 100 by means of 109 and the other connections shown in Fig. 2. Clutch levers 14 and 15 hold the signal clear.

Latch 21 (sectional view) engages with the clutch lever while holding the signal clear. No. 07 (side view) is the clutch armature. Nos. 16 and 17 are buffer levers to prevent the clutch lever from striking the ends of the magnets when the signal goes to danger. They also hold the clutch armature a short distance from the poles of the magnets while the signal is at danger to prevent them from freezing fast in case moisture condenses on them in freezing weather.

Cut-off levers 114 and 115 are to cut-off the supply of gas from the working cylinder, and allow it to escape, when the signal has reached the clear position. These levers are controlled by pawls, 116. The clutch casting, 09, is clamped on the cylinder rod, and is guided by the guide rod 47. This casting can be placed higher or lower on the cylinder rod so as to change the stroke of the cylinder. It also carries the roller 20, which engages pawl 116 at the end of the upward stroke, and cuts off the gas, the signal having then reached the position for which it is adjusted.

The magnets, 39, have front armatures to operate the gas valve, and rear armatures to hold the signal in the clear position.

No. 85, on top of the left hand magnet, is an electric switch operated by rod 44 when it is engaged by the stud 19. This switch does not appear in the perspective view, Fig. 1.

The gage on the reducing valve, 31, has two pointers and shows both the pressure in the supply tank, and the working pressure.

In clearing the signal, the magnets 39 are energized, and the armatures 07 and 12 are attracted; and the valve is opened by means of its connections, 37, 109 and 108.

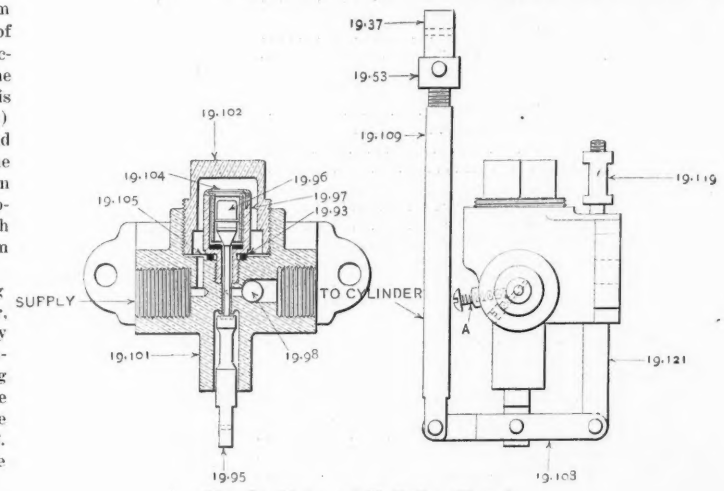


Fig. 3.—Valve of Hall Gas Signal.

The exhaust valve 95 (Fig. 3) is forced against its seat, and supply valve 96 is opened, allowing gas to enter the working cylinder through the pipe 81. This forces the cylinder up, and puts the signal in the clear position. As soon as latch 21 has passed the toe of clutch lever 15, the roller 20 raises the pawl 116 and allows the cut-off lever 115 to move downward. This, being engaged with the nut 119, forces the links 121 and 108 down, opening the exhaust valve 95, and closing the supply valve 96. The entire weight of the signal now rests upon the latch 21, where it is engaged with the clutch lever and is held in the all-clear position on account of the magnets being energized and holding the armature 07.

The electric switch 85, used to change the current in the magnets after the signal is cleared, is operated by

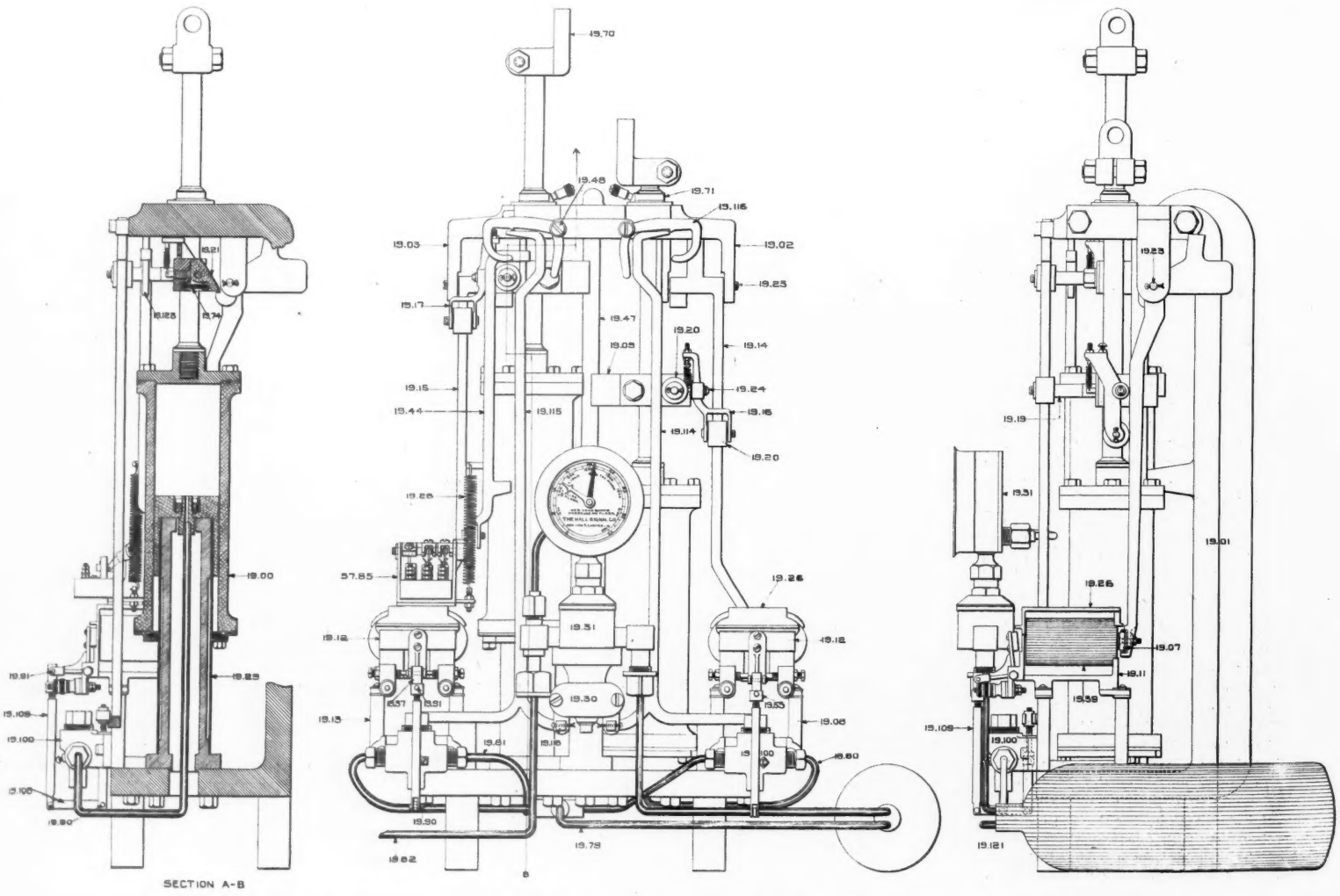


Fig. 2.—Double Gas Mechanism of Hall Semaphore Signal—Front and Side Elevations and Section Through Line AB.

means of the stud 19 raising the rod 44 and rotating the shaft of the switch which makes the contacts.

When the magnets are de-energized, as by the entrance of a train to the section, the armature 07 is released, and the clutch lever 15 swings backward and allows latch 21 to pass the toe of this lever. The signal then assumes the danger or stop position by gravity. The cylinder acts as a dash pot on account of the check valve 98 partly closing the exhaust. The expansion chamber, which is connected between the reducing valve and the electrically controlled valves, serves the purpose of equalizing the pressure in cases where the liquefied gas finds its way to the reducing valve, and part of it freezes when expanding in the low pressure chamber. When this melts and becomes gas, it will, with the small cubic capacity of the reducing valve alone, greatly increase the pressure; but, with the greater capacity of the expansion chamber, the increase is very small.

The cylinders and pistons are made of phosphor bronze and ground to fit; no packing rings are used and no lubrication is necessary. The area of the piston is 5 sq. in. By using 40 lbs. pressure, which makes a force of 200 lbs., there will be at least a margin of 50 lbs. over the weight of the ordinary blade grip. This margin can be increased to anything desired, by increasing the gas pressure. With this pressure and a 60 deg. movement of the arm, 200 signal movements are made per pound of gas, or 10,000 from each 50 lb. tank of gas.

One end of the magnets is utilized to hold the signal clear and the other to operate the valve. The amount of energy required to operate the valve is .1 watt, and to hold the signal clear is .045 watt. By means of two windings on the magnets the energy is reduced, after the valve is operated and the signal is cleared. The two windings are used in multiple to operate the valve; then one battery is disconnected and the signal is held clear with the other; or, in case of slow releasing clutches, the one winding is disconnected from the battery and closed upon itself to prevent the cores becoming immediately demagnetized. A current of four volts is used on these slow releasing clutch magnets, and .0113 ampere. With this energy the signal is held clear 2½ seconds after the circuit is opened.

The first electric gas signal was put up near Buffalo Feb. 4, 1902, and, though somewhat crude, gave satisfactory service for more than a year, when it was replaced by a later design. The road on which this first signal was used, like most other roads which have ordered gas signals, had used electric motor signals extensively, and chose the gas apparatus after carefully comparing it with electric motors in the matter of simplicity, cheapness and reliability. The gas signal has been found to be free from disturbance by frost, as the dry gas which is exhausted into the closed case after each operation of the signal takes up whatever moisture may be in the atmosphere, and there is no deposition of frost on the metallic parts.

At 4½ cents a pound the cost of power for this signal, estimating 200 signal movements per pound of gas, is less than 25 cents per thousand movements. Liquid carbonic acid gas can be bought in almost any large city. The motor could, of course, be worked by compressed air.

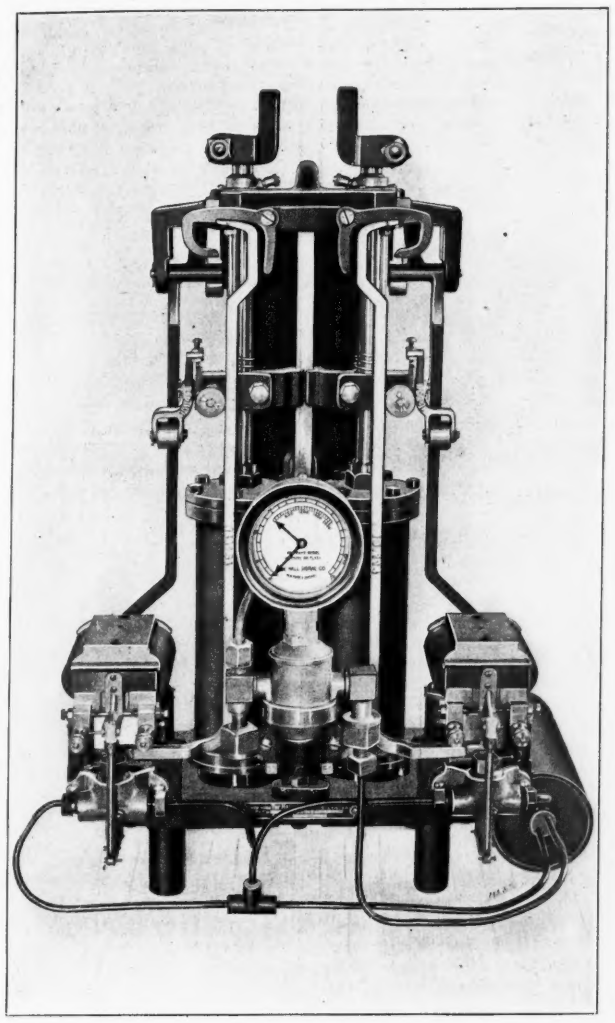


Fig. 1.—Double Gas Mechanism of Hall Semaphore Signal.

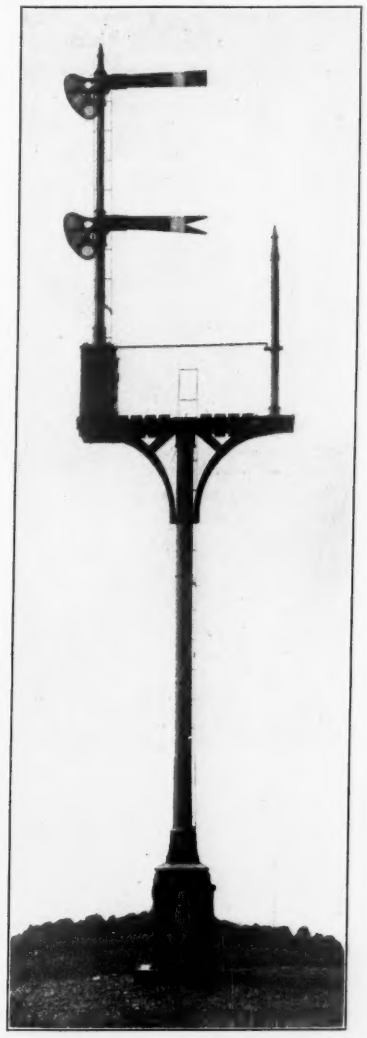


Fig. 4.—Hall Semaphores on Tubular Iron Post.

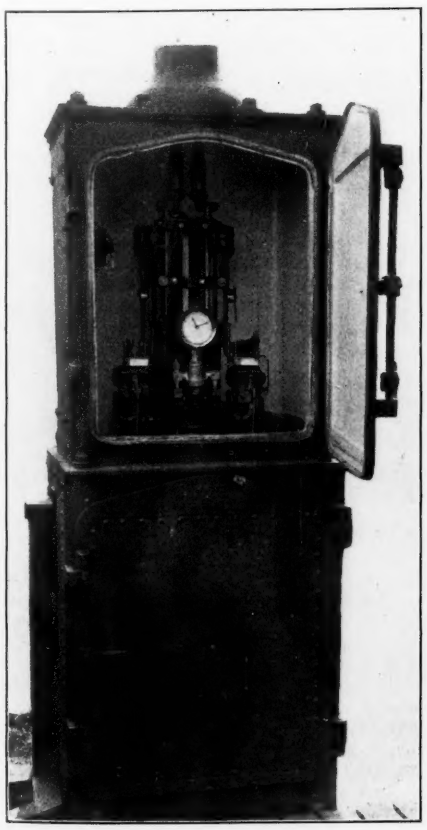


Fig. 5.—Box for Motor and Batteries—Hall Gas Signal.

Car Accountants' Association.

The announcement of the annual meeting of this association will be found in another column. The reports of the committees on (a) Discussion, (b) Per diem, (c) on Large cars and Light loading, together with a paper by Mr. Charles C. Riley, of the Chicago Great Western, will be found in substance below.

SUBJECTS PROPOSED BY COMMITTEE ON DISCUSSION.

1. Is it desirable to report both receipts and deliveries on junction cards, and should they not be sent by U. S. Mail?

2. How should penalty tracers received from other lines be handled, and in case cars have left prior to date of receipt of notices, should car owners be notified?

3. What is the best method of giving the road people the information to show how long foreign cars have been on the road; can agents depend on the route card for this information?

4. Best method for keeping a record of home cars on foreign lines in order to report daily the cars away from home 20 days?

5. Is it desirable, on large roads, to keep a separate junction record of home cars on foreign lines?

6. Errors and omissions on reports of cars interchanged: What is being done to secure uniform practice; what constitutes a delivery to water lines, and is Rule No. 14 intended to cover such deliveries?

7. Best method for handling reports and rendering reclaim statements provided for in Per Diem Rule No. 5.

8. Has it been found practicable to carry out Per Diem Rules 14 and 15? Do rules now in effect release cars and place them in home route quicker than under the mileage basis?

REPORT OF COMMITTEE ON PER DIEM.

During the past year the Per Diem Committee has had two meetings at Chicago, at which a large number of the membership of this Association was present, and the Committee held a number of informal meetings. There is a general feeling that the per diem rate should be increased from 20 to 30 cents; 20 cents is no incentive to secure the return of cars. Neither is it probable that 30 cents will be much of an incentive during the time of car shortage. Delay is as a rule on the borrowing line which can afford to pay 30 cents rather than to purchase cars. The car owner loses money in maintaining equipment at the present per diem rate. When the demand for cars is small, 20 cents or even 10 cents will cause return of cars to owners.

Among the higher officers it is thought that Rule 3 should be so changed as to make its workings automatic. This feeling is not entertained by the majority of Car Service men, who favor the rule in its present form. The Committee has no recommendations to make in regard to this rule. The demand for penalty is now being made by nearly every road whose cars are being detained for more than 20 days. The only important change in the car record office, should the rule be amended so as to make it automatic, would be that the time and watchfulness now expended in writing penalty notices would have to be devoted to the securing of prompter movement of foreign cars.

A great evil has grown up as a result of the application of Rule 3 which would probably become more aggravated were this rule to work automatically, and that is the wholesale diversion to which equipment is subjected. The experience of the Committee is the experience of a large number of Car Service men from whom communications have been received that nearly every road in this country during the past winter seemed to lose all sense of justice in regard to the handling of foreign cars and loaded them regardless of initials and ownership. During the congested period of last winter it was the common practice of a large number of roads to deliver cars to connections for no other purpose than to break penalty. The Committee is not able to suggest a remedy, but is of the opinion that some additional penalty should be imposed for diverting cars to connecting line for that purpose.

Your Committee recommends that where discrepancies exist as to date of receipt of cars, penalty notice covering such cars should be accepted as applying to date as shown by records of receiving road, pending adjustment.

Rule 5 as now applied is a source of revenue for switching lines. An arbitrary number of days cannot be determined in any large switching center which will be fair for each road interested. The bad results arising from the workings of Rule 5 are possibly due as much to the application in the different centers as to the rule itself. As the line bringing a car into a terminal is responsible for its delivery to consignee and therefore liable for the switching service, your Committee feels that such originating line should not be taxed in the way of a reclaim for an amount greater than the actual cost in per diem to the switching line. It would, therefore, recommend to this Association the following substitute for Rule No. 5:

"The road performing switching service for another road may reclaim from such road for each car in switching service an amount equal to the per diem actually paid by the switching line up to a maximum number of days to be determined by the roads directly interested in each local territory."

This rule would do no injustice to either line. If it requires four days for the switching road to deliver certain classes of freight to consignee, the originating line should certainly reimburse the switching road for the per diem paid. On the other hand, if the switching road is able, as is the case in many large terminals to handle hundreds of cars of stock to and from stock yards in the same day for which it pays no per diem, it is certainly not fair that it should be permitted to make a reclaim of 60 or 80 cents per car against the delivering line.

The railroads centering in St. Paul and Minneapolis have taken an advance step in regard to reclaims. On February 1 the following rule was put into effect in the cities named, the workings of which have given general satisfaction: "The payment of reclaims to the Minneapolis

Eastern, the Minneapolis Western and the Railway Transfer of Minneapolis for cars handled by them, is abolished. The roads for which the switching service is performed will assume the per diem on all cars handled by the Belt Lines mentioned above." Conditions similar to those at the Twin City Terminals exist in a great many places, and the membership of this Association should consider abolishing reclaims at common junction points where it is found that the amounts paid and received nearly equal each other.

Shortly after July 1 there were many different ways of settling for reclaims, but by constant agitation the practice has become general of paying reclaims by including the amount in the current per diem reports. Some few roads still insist on making settlement of reclaims by means of bill and voucher, but your Committee reiterates its recommendation that all reclaims agreed to prior to the closing of the monthly per diem report be added thereto by the debtor road, but that the per diem report shall not be delayed on account of reclaims pending.

Rule No. 7 as interpreted is diametrically opposed to the former practice in regard to sending home cars in a general worn out condition. In many instances it has taken from two weeks to three months to secure home route cards for cars which are in a general worn out condition and must be sent to owners. Penalty rate has been demanded and has been paid on cars after home route cards have been asked for. Suggestions have been made recommending an addition to Rule No. 7 something like the following:

"When it is necessary to send a car home on account of general worn out condition due to age and decay, accompanied by M. C. B. home route cards, the payment of per diem on such car shall cease on the date home route cards are requested of owners.

Much dissatisfaction has been expressed in regard to proposed changes to Rule No. 8. At the general meeting held at Chicago on May 9 it was the unanimous opinion of all present that the present rule should be permitted to stand.

Rule 11 is complained of on account of the large amount of labor involved in preparing per diem reports, and a sub-committee, consisting of Messrs. Beecham, Cavanagh and Fellows, will present to the Association a plan whereby the work can be reduced.

Charles Major defines virtue as the absence of temptation and the lack of opportunity. This definition will fit a large number of roads, which heretofore have held up their hands in holy horror at the wrong handling of equipment. The ones who formerly made the worst complaints have during the past winter been the worst offenders.

Taken all in all the workings of per diem have been most satisfactory. A careful inquiry of a large percentage of our membership made with the view of finding disaffection shows that there is absolute unanimity in the belief of the ultimate successful workings of the per diem principle, but there is a great amount of labor yet to be done.

We find that cars on which we receive demands for penalty do not make any more empty mileage than the average empty movement of the total equipment on our rails. It requires some little extra labor to handle tracers in this way, but this is more than overcome by the results obtained.

C. G. W. Ry.—Penalties for Ten Months to May 1, 1903.

Month.	Average sys'm cars off line.	Aver. cars on line. For'n.	Sys'm.	P. c. sys'm.	—Penalty.*— Paid.	Rec'd.
July	1,862	1,959	7,046	79.1	None	None
August	1,652	2,053	7,267	81.3	$38	$58
September	2,078	2,577	6,884	76.8	106	174
October	2,155	3,255	6,145	68.0	93	217
November	3,475	4,502	5,630	61.5	135	641
December	3,235	4,454	5,798	53.1	287	677
January	4,601	3,305	4,547	50.4	221	1,524
February	4,307	2,987	4,706	52.1	120	1,319
March	4,280	2,938	4,724	52.4	139	2,411
April	4,084	3,297	4,916	54.9	199	2,848
Total penalty paid for 10 months						$1,340
Total penalty received for 10 months						9,873

*Cents omitted.

Fig. 1.—"Single" Locomotive—Great Northern of England.

PENALTY NOTICES.

By C. C. Riley.

As every road desires and expects its own cars to be given prompt and proper handling when on the rails of foreign lines, it in turn should make it a point to handle, with as little delay as possible, the foreign cars that reach it in the ordinary course of business. With the advent of per diem, we decided to handle penalty notices as follows:

When a penalty notice is received it is given a telegraphic file number and all papers pertaining thereto are kept together until all cars shown on the notice are disposed of. The cars shown on each penalty notice are located immediately from our records and verified from the Agent's reports. The Superintendent upon whose division the cars are located is advised by telegraph their location and proper home routes, and directed to start them home immediately. Usually we have but little trouble in securing proper loads for these cars, but no car is delivered to a connection for the sole purpose of breaking penalty. If a car is under load immediate steps are taken to secure its release.

It frequently happens that cars, on which penalty is demanded, are not shown in our records. We immediately telegraph to have delivery to us verified. In brief, our method of handling penalty cars is to follow them by telegraph until they are delivered off our rails. An experience of 10 months has demonstrated its practical worth. Our Superintendents are instructed to give immediate attention to telegrams regarding penalty notices, and advise just what can be done.

Cars which are still shown to be with us are entered in a book which we keep for that purpose, and which shows the date of the penalty notice, the date penalty will fall due, the telegraphic file number and the number of days penalty due when cars are held more than 10 days after date of notice. All papers are then filed in regular correspondence file.

On the first of each month, or as soon as our foreign records are transferred, the record which we have in our penalty book is entered upon our regular running records so that the proper number of days penalty will be reported to the owners on regular per diem report.

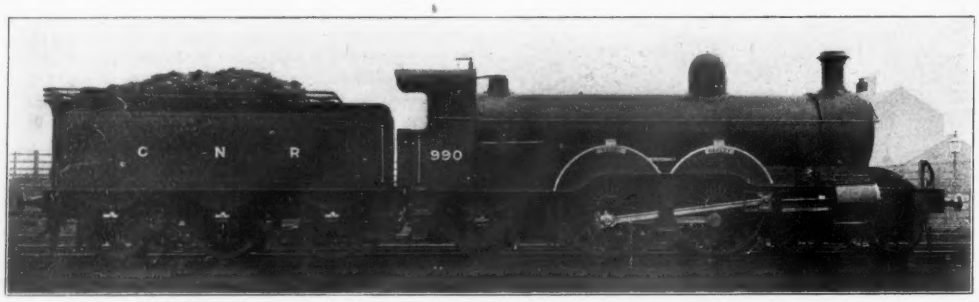


Fig. 2.—One of the First "Atlantic" Type Engines of the Great Northern.

Special Reclaims.—When a car is delivered by one road to another not accompanied by the proper data for forwarding, the receiving line should immediately notify the delivering line and should be allowed to make reclaim against the delivering line for the time from date it notified the delivering line until it received disposition for the car. Should the disposition given for the car make it necessary to return it to the delivering line, the receiving line should have an additional allowance of 24 hours in which to make return of car to delivering line. It should not be given this allowance if the disposition for car requires its movement over the receiving road. In case of cars improperly billed where a mistake is due to instructions received from shippers, the freight should be held good for the per diem accruing while car is delayed.

Uniform Blanks.—Experience has demonstrated the importance of having blanks of uniform size. Per diem reports now vary in size from 3 in. in width to 14 in. Your Committee recommends that the penalty notice, the reclaim statement and the per diem statement be made letter size, 8½ x 11. If a smaller size is considered desirable we recommend that half letter size be used. For convenience in filing the printing on the half size should be lengthwise of the paper.

Several of our most cherished beliefs in regard to per diem have been shattered by our experience of the past winter. It is true that conditions were abnormal and that the test was not a fair one. However, the result is that per diem rules since July 1 have served greatly to expedite the movement of cars to the home roads when they were not needed. During the periods of car shortage the movement to home lines, if not retarded, was certainly not increased. It is possibly true that most of the roads in North America had a greater volume of business than they had equipment in which to handle. The result has been that nearly every road has attempted to retain in its possession every car that it got hold of, regardless of initials or ownership. To do this a number of roads forced the transfer of all cars, both local and foreign, at junction points. We have been informed by a number of roads that this was their only recourse as their connections were not permitting any cars to come to them and would not return cars received in the ordinary course of business.

REPORT ON LARGE CARS AND LIGHT LOADING.

The adoption of a graded scale of transportation charges has neutralized the important advantage which the large 40 and 50 ft. cars gave to those who so eagerly used them, and with the exception of modification in percentages by the Western Classification Committee and the addition of a decreasing scale by the Official Classification Committee, the agitation on the large car question, may be said to be within sight of a final and successful termination.

In the territory of the two Classification Committees which adopted the approved graded scale, only about 4 per cent. of the new cars built in the past year were over 36 ft. in length, showing that over a territory comprising about two-thirds of the continent, the construction of large cars had practically ceased.

As to light loading of cars the Committee has not found it practicable to give attention thereto owing to pressure of work. While per diem may in some instances have temporarily increased the empty haulage, its effect upon the loading of cars is considered to be in the direction of increase rather than decrease in the average load per car.

The Official Classification Committee from June 1, 1903, have raised the minimums from 15 to 20 tons, on pig iron, iron billets, blooms, bars and beams, sheet iron, steel and iron rails, and old axles and wheels; also the following from 15 to 17½ tons: cracked wheat and glucose; and a number of commodities from 10 to 12 tons.

Recent Locomotives of the Great Northern of England.

The accompanying five illustrations represent the principal types of locomotives which have been introduced on the Great Northern of England since Mr. H. A. Ivatt became Locomotive Superintendent of that road in 1896, succeeding the late Mr. Patrick Stirling. The Great Northern has always been noted for good locomotive practice and for many years it was known in England as "the premier line for speed." This pre-eminence was chiefly gained for it by Mr. Stirling with his celebrated "8-ft. single" type of express engine, but with the great increase in the weight of trains in recent years this type has fallen somewhat out of date, though locomotives of this class, rebuilt by Mr. Ivatt with larger fire-boxes and carrying a higher steam pressure (as illustrated by Fig. 1) still do very good work on the line. The modern standard Great Northern express passenger engine is the Atlantic (4-4-2) type and is shown by Figs. 2, 3 and 4. The locomotive shown by Fig. 2 was the first of this type to be brought out and was built at Doncaster about the middle

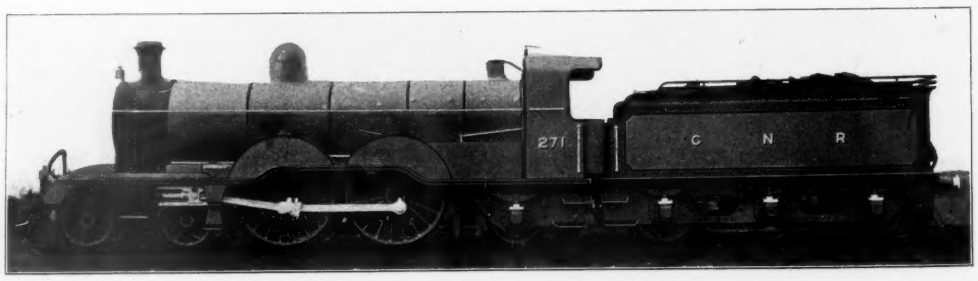


Fig. 3.—"Atlantic" Type Locomotive Built in 1902 for the Great Northern.

of 1898. It far exceeded in power and capacity any engine hitherto built for the Great Northern. The heating surface is 1,440 sq. ft., and the grate area is about 26¾ sq. ft. The heating surface in the fire-box is 140 sq. ft. The cylinders (19 in. x 24 in.) are outside, and the coupled wheels are under the boiler. The working pressure is 175 lbs. per sq. in. The locomotive (Fig. 3), which was brought out last year, is similar in regard to boiler and arrangement of wheels, but differs from No. 990 (Fig. 2) in being a four-cylinder, instead of a two-cylinder engine. The cylinders are each 15 in. in diameter with a stroke of 20 in., and they all drive direct on the first pair of coupled wheels by means of outside and inside cranks.

No. 251 (Fig. 4) is the latest express passenger engine and is also the Atlantic (4-4-2) type. For an English engine it has a remarkably large boiler, the total heating surface being 2,500 sq. ft. The width of the fire-box is obtained by extending it over the top of the frame as shown in the photo. The grate area is 31 sq. ft. The heating surface of this engine (2,500 sq. ft.) compares with 1,030 sq. ft. in the last express engines designed for the Great Northern by Mr. Stirling. No. 1,329 (Fig. 5) is an improved development of the four-coupled passenger engines previously in use on the line and has a much larger boiler than the engines of this type designed by Mr. Stirling, the heating surface being about 1,250 sq. ft. as against 930 sq. ft. in the old four-coupled class.

A new type of eight-wheel coupled engine which was illustrated in the *Railroad Gazette*, March 13, 1903, was

Fig. 4.—Latest Passenger Express Engine of the Great Northern.

designed by Mr. Ivatt for coal and heavy goods traffic. Both his predecessors in office, Mr. Sturrock and Mr. Stirling, designed heavy mineral engines, but the general traffic management of the road was apparently not then ripe for the introduction of such power. Of late years, however, there has been a pronounced movement on all British roads in favor of moving heavier train-loads, and the locomotive now under notice is one of several which have been built in response to this movement. The wheels

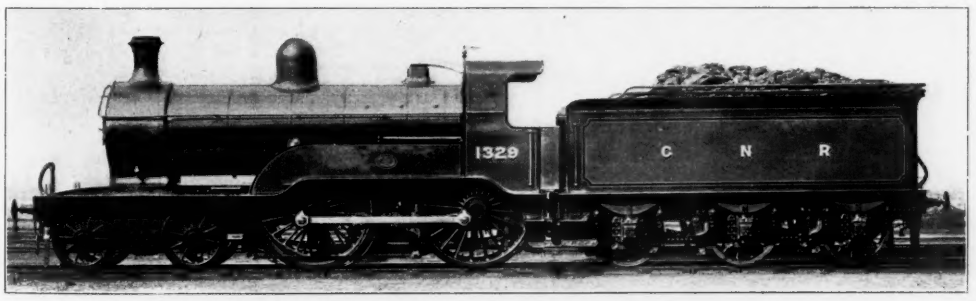


Fig. 5.—Light Passenger Engine of the Great Northern.

are 54 in. in diameter, the cylinders 20 in. x 26 in., the heating surface 1,440 sq. ft., and the grate area 24½ sq. ft. The company has now over 20 engines of this type at work with coal and other heavy freight trains, and a notable reduction in train mileage has been brought about by their use. The total weight of engine and tender is 95 tons.

Some Notes on Steel Car Repairing.

The facilities for repairing steel cars in the railroad shops throughout the country have not begun to keep pace with the rapid increase in the number of these cars. In only a few cases has any attempt been made to provide the necessary tools and repair tracks for this work alone. The roads which do not own large numbers of steel cars but which occasionally have cars on their lines requiring repairs have usually resorted to the boiler shop, employing high priced skilled labor for making comparatively simple repairs. When the steel cars were first introduced there was considerable doubt expressed as to the cost and ease with which they might be repaired, and only recently have any of the roads made serious attempts to bring the repairs of steel cars down to a comparable basis with wooden cars. There is really no more need of employing high priced skilled boiler makers for repairing steel cars than there is in employing them in the shops where the cars are originally made, and were this done by the manufacturers the price of the steel car would be so far in excess of the wooden car as to make the railroad official put aside any consideration of their use.

One of the pioneer installations for the repairs of steel cars is that of the Baltimore & Ohio Railroad at Mt. Claire. Like all of the other roads the Baltimore & Ohio soon after having received a number of steel cars on their first order found themselves face to face with the problem of their repairs. The cars were run into the general shops at Mt. Claire and there turned over to the boiler shop. The number of cars repaired was small and the unfamiliarity of the men with their construction made the cost of repairs relatively high, but this was to be expected. When, however, the number of cars in service was largely increased and the number of cars daily being returned to the shops correspondingly increased, steps were taken to provide some other means for making the necessary repairs. Part of the out-door repair tracks were given over to this work and a number of the regular car repairers who had previously worked only on wooden cars and who had no knowledge whatever of boiler making or structural steel work were put to work under the direction of a practical boiler maker. These men very soon acquired all the knowledge and skill that was necessary for this kind of work, and since that time all of the force employed in these shops in making steel car repairs has been recruited from the men employed on wooden cars. The men are divided up into gangs of four each with a head man, or gang foreman, who directs the work and is supposed to be the most skilful. A second man is employed who is also reasonably skilful and who directs the work in the absence of the head man, one helper and a forge tender making up the rest of the gang. In taking down a car and removing damaged parts the men work in pairs, one man sledging and the other one holding the chisel. In these shops compressed air has been provided, but the supply is not equal to the demand at the present time and the men find it much more expeditious to cut rivets by hand. A general foreman is in charge of all of the work and directs the repairs to be made on each car, it being left to his discretion what repairs to make, whether a sill shall be straightened or spliced or entirely removed, or whether parts be heated and straightened on the cars or removed and straightened in the heating furnaces provided close by.

The general arrangements at Mt. Claire are rather crude, the company having been content to employ means which would do the work and to determine by trial and experiment what tools and methods were best adapted before going ahead and making a complete installation exclusively for this class of work. The so-called light repairs, amounting to less than $5 for labor and material, are usually made on the tracks outside the shops and the heavy repairs are left to be done on the repair tracks provided inside the shop limits. So far but little dependence is placed on the oil or gas furnace for heating the plates and sills before straightening. The practice at this shop is to build a fire of wood or charcoal under the car when it is necessary to straighten a sill and allow the heating process to go on slowly while the gang is employed on some other car near by. An air blast is provided from the pipe running between the tracks, and once having started the fire very little attention is paid to it until the metal has become sufficiently heated to allow of its being worked. The greater part of the repairs consist of straightening or splicing bent or broken center sills and end sills, these being the parts subjected to the severest usage and which fail first in collisions or derailments. Much trouble has been experienced from the cars which were built in the early stages of the steel car development in that the center sills have almost invariably failed by bending or buckling immediately in front of the body bolster. The usual direction of failure is either a bulging outward of both sills, due to a slight bending of the rear follower plates, or a vertical bending which is even more serious. When such cars are brought into the shops a fire is built immediately under the part to be straightened and when a sufficient heat is attained the pulling jack is attached to the sills back of the end sill and to the track, and by turning on this jack the sills are slowly brought back to their original position. In some cases, however, it is necessary to splice the sills and the method adopted at Mt. Claire is to cut off the sills 8 in. from the bolster, cut a piece long enough to extend from this point to the end sill and make a butt joint by riveting a ½-in. flat plate on the inside and a piece on the outside bent to fit the shape of the channel. Eight rivets on either side of the joint give it ample strength and cars so repaired have so far not returned to the shop for further repairs. Wherever possible, second hand material is used in rebuilding the cars. Angles and plates which are very badly bent are removed and taken to the heating furnace, which is adjacent to the repair tracks, and new or second hand parts are supplied in their place. At this heating furnace, which is of the ordinary gas type, a gang of four men is steadily employed in straightening and reworking the damaged parts removed. A large surface plate, or anvil, about 8 ft. x 8 ft., and sledges, flatters, swedges and other smith shop tools are provided. These men are paid by the piece, and while not previously having had any experience they soon become very expert in reworking the badly damaged parts, which are returned to the forge. End sills and end and corner posts, which parts receive the most severe damage, are usually remade by these men and stored in the stock piles for applying on other work. The straightening of plates is comparatively simple and but very little of this work is now sent to the boiler shop. One furnace and a gang of men do practically all of the heating and straightening.

In cases where the plates are punctured or so badly bent as to require splicing or the cutting out of certain portions, a patch is simply placed on the outside. In some cases in straightening end sills one of the flanges will tear and when this happens a patch is riveted over it and no further attention paid to such a defect. Considerable trouble is experienced with the hopper doors and these perhaps give as much trouble for comparatively minor repairs as any other part of the car, it being very difficult to properly adjust the toggle arms after having straightened the stiffening angles on the bottom edges of the doors and making the doors tight. Hand riveting is used almost exclusively and no great pains are taken to finish the heads smooth. Doubtless, to many people the work turned out in this and other shops appears slovenly and unworkmanlike, but the gist of the whole matter is that the repairs so made serve their purpose quite as well as if every rivet was perfectly finished and every dent straightened and the whole car sent out in perfect condition. The question to-day in repairing cars or locomotives is not a question of appearance but one of utility and dollars and cents. A rivet that can be driven in 15 seconds and that will hold, even though it be rough and unfinished, serves its purpose as well as the rivet on which 30 seconds or a minute is expended in finishing and the time saved in the rough job will pay for putting in several rivets. It is not a proper or commendable state of affairs which prompts slovenly work but the railroad official is looking for results and not for appearances. The condition of affairs at Mt. Claire is better than in a great many other shops in this country where this same kind of work is being done, and these statements should not be taken as a reflection on the policy of a road which is perhaps repairing more steel cars to-day than any other. Their repairs are sufficiently good and because they do not attempt to put out the cars built like a watch is no reflection on the industry and perseverance displayed to achieve results.

Another shop which is identified with the very early history of the steel car is that of the Bessemer & Lake Erie at Greenville, Pa. Most of the repairs for this road are done here, and their experience has been exactly the same as that of the Baltimore & Ohio. High priced boiler makers were at first employed and later common laborers were broken in and have since proved very satisfactory. Preparations are being made to supply compressed air by pipes between the repair tracks and the mains and connections have already been laid, but as yet the compressor has not been installed and all of the work is being done by hand. The same methods for heating and straightening sills by means of wood fires built under the car are used in these shops. What has been said about the work at Mt. Claire applies with almost equal truth to that at Greenville, the methods employed being practically the same and the quality of the work turned out being about equal. The men at Greenville are paid on a day rate, while those at Mt. Claire are paid by piece work entirely, but there seems to be very little difference in the character or amount of work turned out by the men.

Perhaps the most model shop for the repair of steel cars to be found to-day is that of the Pittsburgh & Lake Erie at McKees Rocks. Everything has been done to

facilitate the work at this point, and further improvements are contemplated when the new shops now building are ready to be occupied. Just at present the old roundhouse, which has been abandoned for locomotive use since the erection of a new roundhouse, which is part of the extensive improvements planned at this point, is being utilized for car repairing, giving some sort of protection from the weather for the men. The pits have been floored over, however, and compressed air piped overhead, with connections dropping from the ceiling between each stall. Natural gas is piped into the building and is used as a fuel in the portable furnaces for heating and also in the rivet forges. Pneumatic tools are here used successfully and the quality of the work turned out is excellent. A slightly different practice is used in repairing center sills from that employed by the B. & O., in that any splices which are made are made back of the body bolster and a reinforcing plate riveted to the outside of the sills, leaving out the flat plate used on the inside face of the sill. But little second hand material is used owing to the fact that new parts can be so readily ordered and delivered from the works of the Pressed Steel Car Co., only a short distance away.

The Lake Shore & Michigan Southern Railroad has planned to utilize a portion of their car shops at Collinwood for repairs to steel cars, but at present the equipment has not been fully decided upon. All the heavy repairs, however, will be made under cover. This road has recently purchased a number of structural steel cars and will have a chance to experiment somewhat on methods for their repair. The remarks previously made about the Pittsburgh & Lake Erie and the Greenville and Mt. Claire shops apply almost exclusively to pressed steel cars, and there may be some new difficulties arising from the use of structural steel cars not met with in pressed steel cars.

The general experience of the railroads has been that the steel car is no more difficult to repair, when the proper facilities are provided, than the wooden car, and that it pays to repair a steel car which is so badly damaged as to appear fit for the scrap heap. In one instance repairs amounting to more than $300 were considered profitable to make, and when the car was turned out, having been built from the trucks up, it was practically as good as new. The strength of the material is not decreased by heating and straightening, and practically every piece of a car in a collision or derailment can be successfullly straightened and used the second time, in rebuilding that particular car or in some other repairs. The pneumatic tool is a valuable adjunct to the equipment of a shop for repairing steel cars, and with its rapid introduction into boiler shops and locomotive shops generally, there is no reason to believe that its use could not be economically extended to the repair tracks in the adjacent yards.

Electrical Installation for Suburban Traffic on the North Eastern.

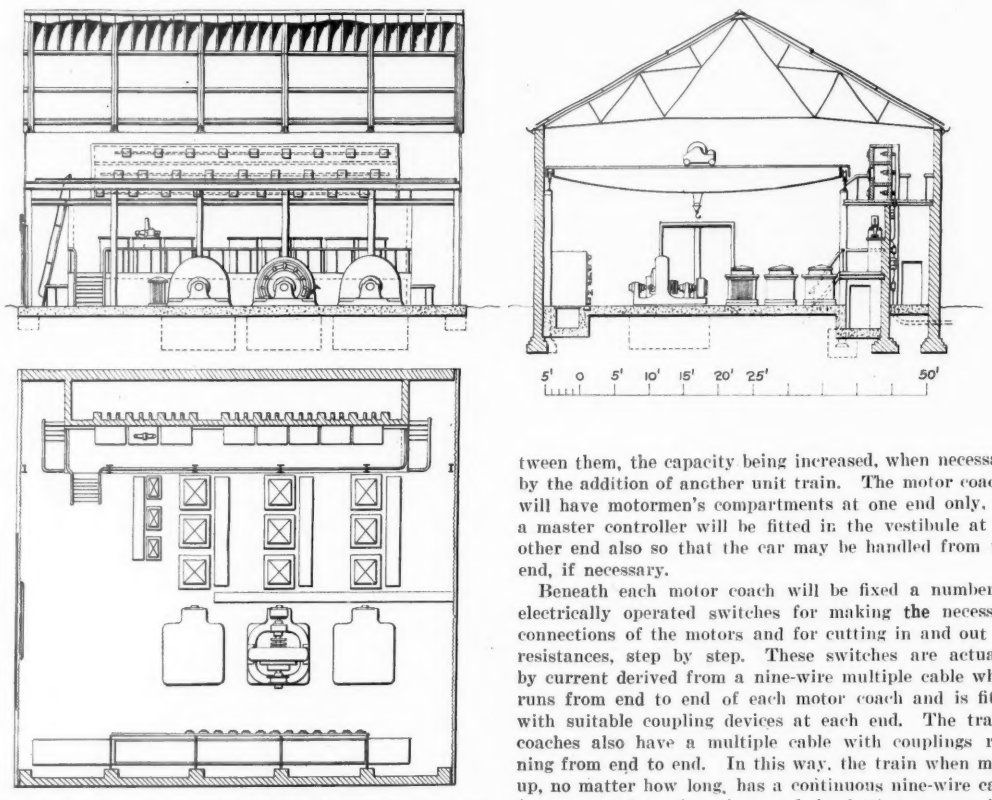
The North Eastern has been the first of all the great English lines to grapple, on a really large scale, with the problem presented by the steady increase in working expenses and the competition of traction lines. The proposal to electrify a portion of the suburban system in the neighborhood of Newcastle-upon-Tyne is therefore of considerable interest, more especially as the conditions prevailing on these lines are typical of those which must, sooner or later, be faced by every railroad manager throughout England if he wishes to increase or even to maintain the profits derived from suburban traffic.

The accompanying map shows the lines which are now being electrically equipped and also indicates the position of the generating stations and sub-stations which will provide the necessary electrical energy. The city of Newcastle is situated some eight miles from the mouth of the Tyne, the intervening districts on both banks of the river being densely populated and containing an almost continuous succession of shipbuilding yards, and engineering and other works. To the north of the mouth of the river lie Tynemouth and Whitley Bay, which are residential districts in addition to being the favorite holiday resorts for the whole of Northumberland. Between Newcastle and the sea there is therefore a large traffic the whole year round, and this is swelled to enormous proportions during the holiday seasons.

The lines which are now being electrically equipped for passenger service are at present operated by steam locomotives with the exception of the line from Gosforth to Ponteland which is now building. The Quayside Branch line, which is used for freight traffic only, is also being equipped for electrical operation, the object in this case being to overcome the ventilation difficulties which now prevent the line from being fully utilized owing to the fact that it is, for the most part, in tunnel and on a heavy gradient. The engineering conditions to be met present features differing essentially from those prevailing in the electrification of a London tube railway, because some 37 miles of single, double, and four-line track are involved, and there are numerous junctions, crossovers, and other pieces of special track work. There is also a very heavy goods traffic to be provided for, which, except on the Quayside Branch will continue, at any rate for the present, to be dealt with by steam locomotives.

After careful examination of the advantages and cost of various systems it has been decided to operate the trains by continuous current obtained from a single collector rail placed in the six-foot way with a return circuit through the running rails. The current will be derived from rotary converters and static transformers which convert three-phase current at a pressure of 5,500 volts and periodicity of 40 into continuous current at a pressure of 600 volts. The collector rail will be of steel of special high conductivity; Vignoles section, 80 lbs. per yard, carried on insulators composed of reconstructed granite placed outside the running rail and distant 3 ft. 11½ in. from center of the track. On double track the separate collector rails belonging to each track will be normally placed between the two tracks, but at junctions, crossings, etc., or wherever there is any obstruction in the 6-ft. way, it can be transferred to the outside of the track as required. At level crossings, stations, etc., the collector rail will be protected by two creosoted boards bolted against distance pieces on each side of the rails. Under normal conditions, this rail will have no protection, but holes are being punched in all the collector rails so that protecting boards may be readily applied at any place found desirable. Instead of adopting a second collector rail in the center of the track for the return current, as has been done in some cases, it was found that the Board of Trade requirements could be more economically met by bonding the running rails, similar to American practice, but the position of the single collector rail has been so fixed that a return collector rail can be installed between the rails at any future time should this prove desirable in the event of great extension of the traffic on these lines.

It was found that the North Eastern standard fish plate did not allow sufficient space between it and the web of the rail to admit of the use of protected bonds, so, since it was considered that this type of bond was essential, a new fish plate giving more room has been specially designed by Mr. Chas. A. Harrison, the Engineer of the line. As the bonding of the track proceeds all the present fish plates will be replaced by those of the new design, and those removed will be utilized on other parts of the system.



Arrangement of Sub-Station—North Eastern Railway.

Current will be supplied to the collector rail from five sub-stations, located at Pandon Dene, Wallsend, Cullercoats, Benton and Kenton. The arrangement of the whole of these sub-stations is of a uniform design and similar to that shown in Fig. 2. Fourteen 800 k.w. rotary converters will be installed, distributed among the various sub-stations so as to best meet the load. The sub-station containing the largest plant capacity will be Pandon Dene, where four of these rotaries will be installed. In order to meet the excessive fluctuations of the load each rotary has been specially designed to operate without serious sparking at an overload of 100 per cent. for 10 minutes and at an overload of 200 per cent. momentarily. The main static transformers are of the single phase, oil insulated, self-cooling type. To each rotary converter is coupled a small induction motor fed by a special transformer, and the rotary converter is started up by means of the induction motor until it attains the synchronous speed of the rotary, when it is switched on to the high tension busbars in the usual way.

With a view of simplifying the arrangement of cables and loads inside the sub-station the high tension switches have been placed along one side of the sub-station, while the low tension switchboard will be placed on the opposite side of the building. Only the positive leads will be taken to the low tension switchboard, the negative busbar running near the floor behind the switchboard and the equalizing switches being mounted close to the rotaries. The high tension switches will be of the "oil" type, the feeder switches being provided with an automatic reverse current release, and the converter switches with an overload time limit release, all being operated electrically by low tension continuous current for which a small battery is provided in each sub-station. High tension and low tension watt meters are provided for measuring the input and output of each sub-station.

The sub-stations are designed to facilitate extension in either direction, and the ends will be of galvanized iron arranged for easy removal. These stations will receive their supply of energy at a pressure of 5,500 volts, three-phase, through three-core, paper insulated, lead covered cables laid solid in wooden troughs along the right of way. Cables will also be laid for the lighting of all stations on the lines, but the exact manner of doing this is not yet decided upon.

The new rolling stock will comprise motor and trailer coaches, the bodies of which will be built by the North Eastern at the York works, from the designs of Mr. Wilson Worsdell, Chief Mechanical Engineer. They will be of the open corridor type, lighted and heated by electricity. Each coach will be carried on two four-wheeled bogie trucks built by the Brush Electrical Engineering Co. to Mr. Worsdell's specifications, and each motor coach will be equipped with two G. E. 66 motors, each rated at 150 h.p., both motors being carried on one bogie truck.

As will be seen from the map, the central station at Newcastle is a terminal station as far as the lines to be electrically operated are concerned, since the trains have to be taken in by one locomotive and out over the same lines by another, and the difficulty of working the suburban traffic is therefore great. Hence, in considering the electrification of the line, there was never any question but that the multiple unit system of rolling stock was the correct one to adopt. The unit train will be composed of two motor coaches with one trailer coach between them, the capacity being increased, when necessary, by the addition of another unit train. The motor coaches will have motormen's compartments at one end only, but a master controller will be fitted in the vestibule at the other end also so that the car may be handled from this end, if necessary.

Beneath each motor coach will be fixed a number of electrically operated switches for making the necessary connections of the motors and for cutting in and out the resistances, step by step. These switches are actuated by current derived from a nine-wire multiple cable which runs from end to end of each motor coach and is fitted with suitable coupling devices at each end. The trailer coaches also have a multiple cable with couplings running from end to end. In this way, the train when made up, no matter how long, has a continuous nine-wire cable from one end to the other, and, by letting current into any wire of this cable at any point in the train, the corresponding electrically operated switches on all of the motor coaches are simultaneously actuated, and thus the necessary combinations of motors and resistances are made simultaneously on each of the motor coaches. The apparatus by which current is introduced into this nine-wire cable at the will of the motorman is termed a master controller and can be placed wherever desirable. For instance, in addition to a master controller in the motorman's compartment at each end of the train, one may be placed at the other end of each of the motor coaches, or even on the trailer coaches—in fact, at any place from which there is likely to be need to control a train. Suitable interlocked handles are provided so that it is not possible to leave a master controller in a wrong position or to work two of them simultaneously.

The coaches will be fitted with the Westinghouse air-brake, a motor driven air compressor being provided for this purpose.

A general view is shown of the floor plan of the unit train consisting of three coaches, and from what has been said above, it will be readily understood that a train of any number of vehicles from one upwards may be made up and operated with equal facility. A detailed view of one of the motor coaches, on larger scale, is also shown. It will be seen that it has been considered desirable to make provision for two classes of passengers as well as accommodation for passengers baggage, in which respects the arrangements are different from those on the tube railroads in London. For collecting the current from the live rail each motor car will be provided with four contact shoes, one at each side of each bogie truck, and the whole of the contact shoes of each train will be connected together so that the train will not lose its supply of cur-

rent at junctions, crossings, etc., where the continuity of the third rail must necessarily be broken.

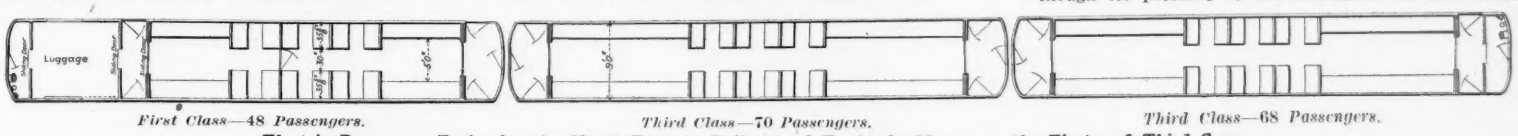
The ordinary accommodation train will take about 23 minutes for the journey from Newcastle to Tynemouth, the average speed being about 22 miles per hour, including stops. Quick trains running through without stops will reduce this time to 15 minutes. There will be two electric locomotives for the Quayside Branch, and these will be equipped in the same way as the motor coaches, with multiple unit controller, Westinghouse air-brakes, etc. Each locomotive will be capable of starting with and hauling a train weighing 150 tons up a gradient of 1 in 27 at a speed from nine to ten miles per hour.

directly under each turbine so as to secure the highest possible vacuum. The alternator will be of the rotating field type with direct coupler exciter, and will generate three-phase current at a pressure of 6,000 volts and a periodicity of 40 per second.

The engineer, under whose advice the scheme of the North Eastern Railway Co. for the electrical equipment and working has been designed, and is being executed, is Mr. Charles H. Merz, of Victoria street, Westminster, and of Newcastle-upon-Tyne. The following main contracts have been placed:

The British Thomson-Houston Co. Ltd., electrical equipment of rolling stock and permanent way.

perature of the water as low as 100 deg. F. or as high as 400 deg. F. Whenever the steam is in the immediate presence of the water from which it is generated, it is said to be saturated. If it becomes entrained with finely divided water, the mixture is referred to as moist steam. Moisture in steam does not affect its temperature, which always remains dependent upon its pressure, the temperature rising or falling as the pressure is increased or diminished. If, however, steam is removed from the immediate vicinity of the water from which it was generated, it may be heated to a higher temperature than that of the water from which it is generated, even though its pressure is not increased. It then becomes



First Class—48 Passengers. *Third Class—70 Passengers.* *Third Class—68 Passengers.*

Electric Passenger Train for the North Eastern Railway of England—Motors on the First and Third Cars.

Instead of building a generating station, the company will purchase its current from the Newcastle-on-Tyne Electric Supply Co., Ltd. A portion of this current will be generated at the existing Neptune Bank Station at Wallsend, but this station is now worked nearly to its full capacity, and the supply company has in course of erection a larger station, situated at Carville, about half a mile further down the river. It is from this new generating station that the bulk of the supply to the North Eastern lines will eventually be obtained. The designs for this new station are now completed and the contracts let. The generating plant is to consist of steam turbo

The British Westinghouse Electric & Manufacturing Co. Ltd., complete equipment of sub-stations.

Messrs. Siemens Bros. & Co., Ltd., three-phase high tension, telephone, and pilot cables, etc.

Superheated Steam in Locomotive Service.

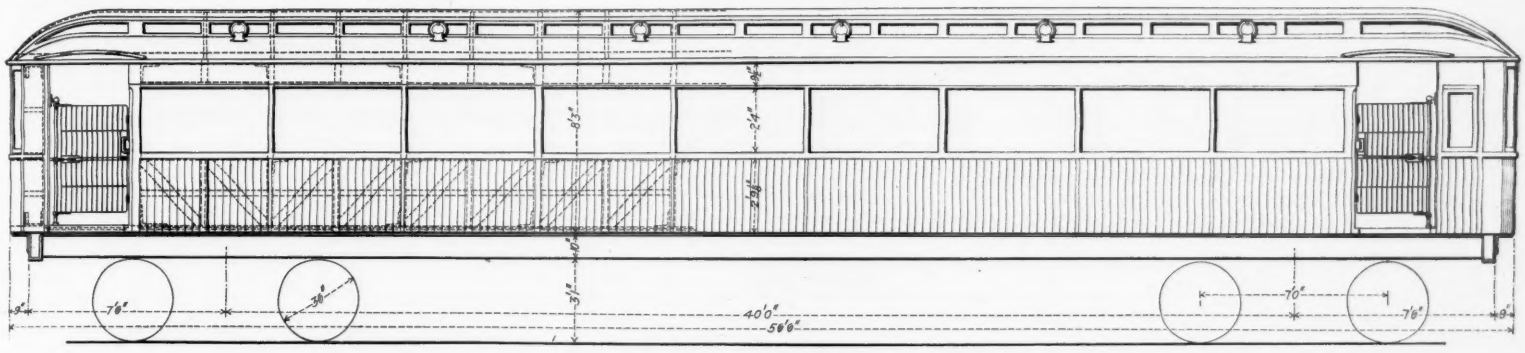
I.

An Elementary View of the Problem.

The efforts which have been made in recent years to improve the performance of the American steam locomotive have manifested themselves chiefly in a better design of parts, in the choice of better materials from which to construct these parts, and in the adoption of mechanism better suited to present day requirements. Except in so far as compounding has prevailed, little has been done in the application of new principles of design. In this latter respect, foreign practice has outstripped the American. The French have made extensive use of better principles in balancing, and the Germans are just now interested in a type designed for superheated steam.

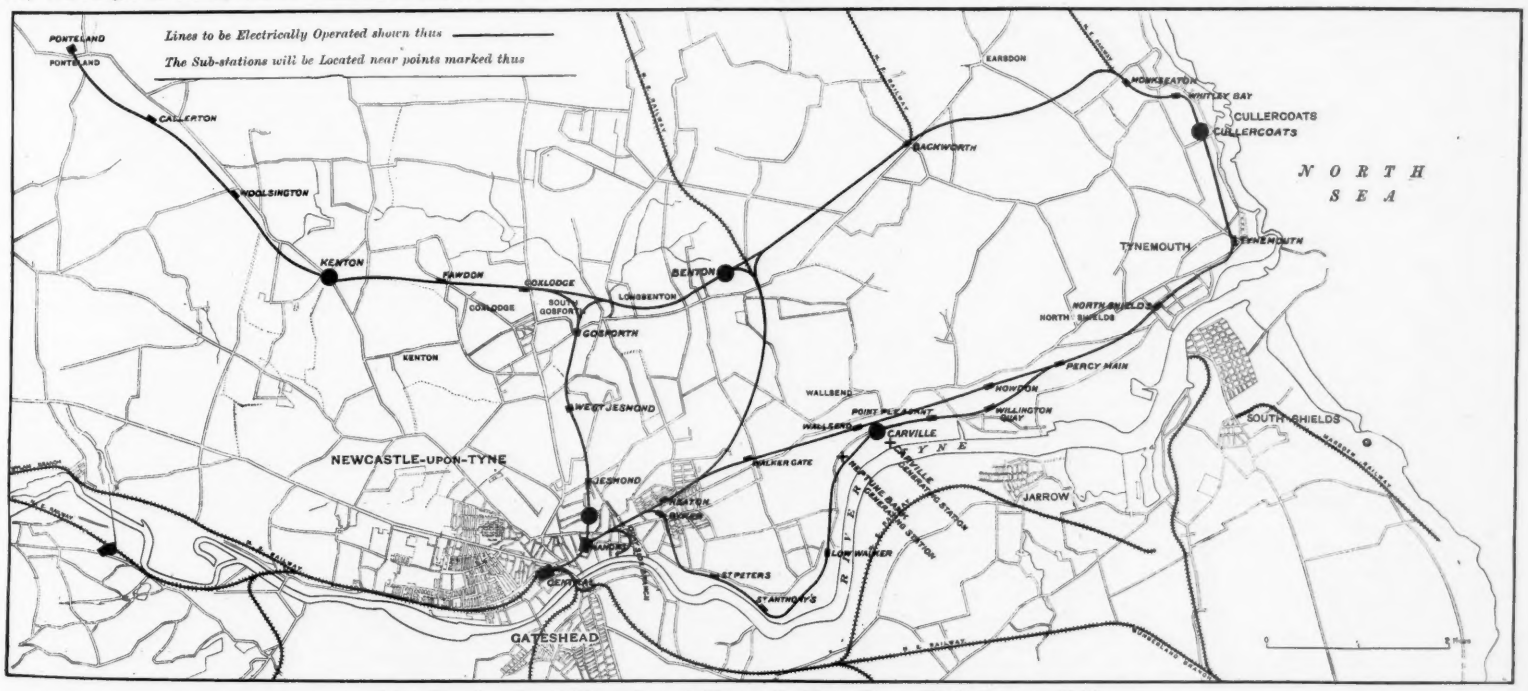
superheated steam, the extent of the superheating being measured by the difference between its temperature and that of saturated steam of the same pressure. Superheated steam can never carry moisture. If heat is gradually taken from it, the degree of its superheat is reduced, until finally the superheating disappears. It is then dry and saturated; with any further withdrawal of heat, condensation begins and the mixture becomes part steam and part water.

It is true beyond question that the substitution of superheated steam for saturated steam is invariably attended by an increased efficiency of an engine. It is



Third Class Electric-Motor Car—North Eastern Railway of England.

generators each of 3,500 k.w. with an overload capacity of 5,000 k.w. for two hours, and the order for these has been obtained by Messrs. C. A. Parsons & Co. As the space occupied by such a set compared with that taken up by the boilers necessary to supply it with steam is very small, the usual arrangements of placing the boiler house parallel with the engine room has been abandoned, and instead each turbine unit will have a separate range of boilers running at right angles to the engine room. Every two ranges of boilers will be combined in one cen-



Map Showing Local Lines Around Newcastle-Upon-Tyne—North Eastern Railway.

trally fired boiler house and will be provided with independent flues, economizers, induced draught fans, and a short iron chimney. The contract for the complete boiler house equipment has been secured by Messrs. Babcock & Wilcox.

By this arrangement a very short and simple steam pipe system is secured and it is possible to increase the size of the generator unit without affecting the scheme of the station or interfering in any way with plant already installed. The station can be extended in either direction. General arrangement drawings of the Carville power station are shown. The turbine sets will be supplied with steam at a pressure of 200 lbs. per sq. in., and superheated by 150 deg. F. A condenser will be placed

This new German type is a single expansion engine but its performance is said to equal that of the several well-known types of German compounds. In a discussion of its merits it will be of interest first to consider in what manner the use of superheated steam contributes to the economy of an engine, and the relation of the process introduced by its use, to others with which we are perhaps more familiar.

In the process of its generation, steam always has the temperature of the water from which it is produced. What this temperature is, depends entirely upon the pressure to which the water and the steam above it are subjected. Under conditions which are common in practice, the pressure may be varied so as to make the tem-

known, also, that the more favorable action attending the use of superheated steam is due to a reduction in the interchange of heat between the walls of the cylinders and the steam, and while the actual differences in action are very complex, a discussion of them in general terms is not difficult to follow.

Dealing first with an engine using saturated steam, and assuming that the piston is at the beginning of its stroke, and that the steam port is open, it is evident that as the saturated steam rushes into the cylinder, it finds

the metal which bounds its volume at a comparatively low temperature. The incoming steam must, therefore, give up a portion of its heat to raise the temperature of the walls of the cylinder. For each unit of heat thus transmitted to the metal, a portion of the steam must be condensed. Condensation continues with the forward movement of the piston until by the time the cut-off is reached, a considerable portion of all the steam admitted, is present in the cylinders only as water. The extent of this condensation varies with the conditions of running. In general, it may be said to equal a quarter or a third, or even a greater fraction of all steam admitted. The moisture thus formed covers the interior walls of the cylinder just as atmospheric moisture, on a warm day,

covers the exterior walls of an ice pitcher. After cut-off is passed and expansion begins, there is a gradual reduction of the pressure of steam and consequently of its temperature, until as the forward motion of the piston proceeds, the point is finally reached where the steam within the cylinder is no longer hotter than the surrounding walls, and condensation then ceases. Still later, as expansion proceeds, the temperature of the steam falls below that of the walls, and a return movement of heat begins, the heat from the metal serving to re-evaporate portions of the moisture resulting from the initial condensation. But this restoration occurs late in the stroke, too late to be of material service, and its extent is so limited that when the stroke is finished, a very large portion of the initial condensate is still present in the cylinder as water. When the exhaust-port opens, the pressure and consequently the temperature of the steam which remains after all excess has passed out, are reduced to minimum limits. The metal of the cylinder is now much hotter than the frost-like moisture which clings to it, and gives up heat rapidly, converting the moisture upon its surface into steam which when generated passes out of the exhaust-port of the engine. It is important to observe that the heat which is required to evaporate this moisture all comes from the walls of the cylinder. In consequence of this action, the walls become cooled far below their mean temperature, making it necessary for the incoming steam of the next stroke to again heat them, the whole process being repeated with each successive stroke of the engine.

By the process just described, heat is taken from the steam during admission, before it has had time to do any considerable work in acting upon the piston. It is restored in part late in the stroke, but chiefly during the return motion of the piston, too late to be of service in doing effective work. It enters the cylinder as steam and leaves it as steam, but during the interval between admission and exhaust, which events mark the effective stroke of the piston, a considerable portion of the whole has existed as water, in which form it has been incapable of doing work. The action of the walls in thus depriving the steam of much of the power it would otherwise have, may be likened unto a thermal sponge which absorbs heat during the effective strokes and gives it out again when its chance for doing work has passed. Again an examination of the process by virtue of which this action proceeds will make it evident that moisture is the vehicle upon which the heat transfer is made, and that if the moisture could be suppressed, the value of the heat transferred would be reduced. In view of these facts, it appears that the problem of producing a highly efficient engine is one of reducing the interchange of heat between the steam and the metal of the cylinder, or of adopting a cycle which will serve completely or in part to neutralize its effect.

A reduction in the interchange of heat between the steam and the walls of the cylinder of reciprocating engines may be effected by the adoption of one or more of four different procedures, which are as follows:

The first is that which involves a cylinder of non-conductive material. The theory assumes that the losses observed in existing engines are due chiefly to the ease with which the cast-iron of which they are composed receives and gives up heat, and that if it were possible to find and make practical use of a metal having a lower degree of conductivity, the interchange would be less. A great deal of ingenious work has been done along this line, the effect of which has been to show that this theory is correct, but the construction problems are difficult, and the development of this idea into a practical engine for everyday work has yet to be accomplished.

A second plan is that of steam jacketing. By this plan, steam is circulated in a space or jacket surrounding the working cylinder. The pressure of the jacket steam is equal to or greater than that admitted to the cylinder, and hence the jacket temperature is higher than the average temperature within the cylinder. The jacket, therefore, serves to prevent, in some measure, the cooling of the cylinder during exhaust. While its use does not result in the maintenance of a constant temperature in the cylinder walls, it materially reduces the range of change which would otherwise take place. The result is that by keeping the walls of the cylinders warm during exhaust, there is less transmission of heat from the metal out through the exhaust port, and the walls being comparatively warm at the beginning of admission, the initial condensation is less, and so on through the whole cycle, for that which reduces interchange at one point, has an effect on the interchange throughout the revolution. Steam jackets are much used on stationary engines and marine engines of the better sort. While the jacketed engines of the Lancashire & Yorkshire may be referred to as representing advanced practice in this regard, and are said to be giving good service, jackets have not as yet been extensively used in locomotive service.

Another plan for reducing interchange of heat is to be found in the adoption of compound or triple expansion cylinders. By this plan, the desired result is sought by dividing the total range of temperature to which the engine is subjected into two or more parts, and by then assigning a cylinder to each part. By these means, the difference between the initial and final temperature to which any given cylinder is subjected is reduced. In a compound engine, it is but half that of a single expansion engine, and in a triple expansion engine, but one-third that of a single expansion engine, the initial and final temperature being the same in all cases. This statement, while not of scientific accuracy, is, nevertheless, a close approach to the truth. It is sufficiently accurate to show the basis for the gain that results from the use of the multi-cylinder engine. This is to be found in the fact that the range of cylinder temperature being reduced, the interchange of heat between the steam in any cylinder and surrounding walls is reduced, the initial condensation is less, and a larger percentage of the total steam supplied is present in the cylinder as steam. With respect to compounding, designers of locomotives have made heroic endeavors to keep up with the general progress of steam engine design, with results which are too well-known to need recounting in this connection.

A fourth plan for reducing the interchange of heat between the steam in an engine cylinder and the metallic walls surrounding it, is that of superheating the steam before admitting it to the engine cylinder. As already pointed out, superheated steam may be made to give up heat without producing condensation. It is to this fact that the increased economy resulting from its use is due. When such steam is admitted to a cylinder, the walls which have been left cool by the preceding exhaust are raised in temperature by the heat of its superheat. If the degree of superheating is sufficient, there will be no initial condensation, consequently, as the stroke proceeds, there will be no accumulation of moisture on the walls of the cylinder, and when exhaust occurs, there is no moisture to be vaporized. There is, therefore, no vehicle which can be active in conveying heat from the walls of the cylinder out through the exhaust port, and, hence the incoming steam for the next stroke finds the walls but little cooled and the extent of the interchange throughout the cycle is reduced.

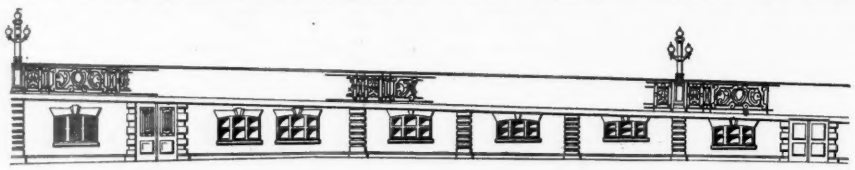
Summarizing briefly, it may be said that superheated steam, in common with jacketing and compounding, improves the performance of the engine by reducing the interchange of heat between the steam in the cylinder and the metal surrounding it. The precise manner in which this is accomplished is, however, different for each of the three cases. With superheated steam, the interchange is reduced by the complete or partial elimination of moisture in the cylinder; with jackets, the interchange is reduced by a suppression of evaporation during exhaust; and with compound cylinders, it is reduced through a reduction in the range in temperature to which the cylinder walls are exposed. When, therefore, it is announced that a locomotive using superheated steam has given a performance equal to that of a compound locomotive, there is no occasion for surprise for the possibilities are equal or greater.

There is one incidental matter which should receive passing attention. It is usually assumed that the use of superheated steam in engines makes difficult the cylinder lubrication, but except when conditions have been abnormal this has not been the case. The reason is that an engine which is supplied with steam superheated several hundred degrees does not have superheated steam in its cylinder. That which is in the cylinder is normal saturated steam except that the water of condensation is absent. Cylinder temperatures, therefore, are not materially greater when superheated steam is used than when saturated steam is used, and, hence, there is no increased difficulty in lubrication.

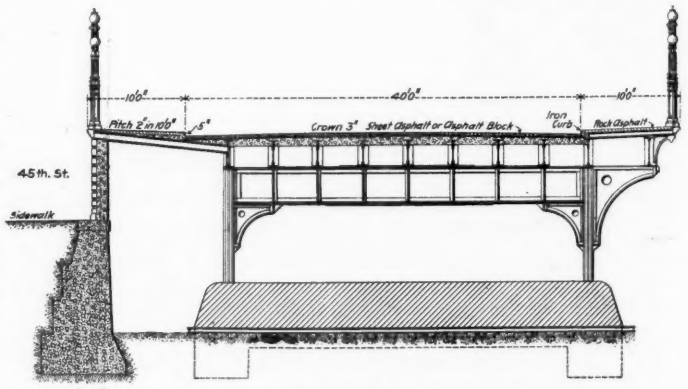
(To be Continued.)

The New York Central Terminal Changes.

On May 27th, the proposed changes in the tracks and overhead crossings on the New York & Harlem road, north of 45th street, in New York City, were approved by the Board of Estimate and Apportionment. The plan for the new terminal station and for the tracks below 45th street, has not yet been submitted and probably will not be for some little time. In general, the tracks are to be lowered, ornamental viaducts, the approaches to which will have a maximum grade of 4 per cent., will be built over the tracks at the cross streets which are now closed to vehicle traffic, and Park avenue will be carried on a viaduct from the 49th street bridge to the new station, at 45th street, providing another outlet for carriages containing passengers. A full description of these changes, with drawings, was given in our issue of Jan. 2. The present illustrations show in detail profiles of the viaducts at 53d, 54th, 55th and 56th streets, giving the grade or depth to which the tracks are to be built under the viaducts; also a profile of the track changes at this point, and an elevation and cross section of the 45th street bridge.



Elevation of South Side of 45th St. Bridge.



Cross Section of 45th St. Bridge.

New York Central Improvements.

London Electric Tramways.

Engineering, in a recent issue, has an interesting article about London electric tramways. It says in part: "American citizens have for many years enjoyed the full advantage of electric traction on street railroads; in some English cities the same boon has been the lot of the people for three or four years, but in London, where the 'Dog in the manger' policy of the British municipality attains a high degree of pugnacity, we are only this week to witness the inauguration of the first London electric tramway. The first car will run from Westminster to Toot-

ing, and thereafter electric cars will be used on the Waterloo and Blackfriars route to the same boundary terminus. The length of the line about to be opened for electric traffic represents 16 miles of single track. Four more miles will be built in August. The whole of this will have been built by Messrs. J. G. White & Co., Ltd., and this firm, together with Dick, Kerr & Co., Ltd., are now engaged on building 20 more miles from Elephant and Castle to Greenwich. The cars which are to be used on this road are 31 ft. 6 in. long, accommodating 66 passengers.

The London County Council, concurrently with the opening of the line, has issued a report by its electric tramway engineer, J. H. Rider. A somewhat alarmist interpretation has been placed on this report, but there is nothing in it to justify such a view. The conduit system of electric traction has its advantages and disadvantages as well as the overhead trolley arrangement. There is, however, no reason for supposing that the conduit system will not work satisfactorily. The whole question resolves itself into one of cost. It has much to specially commend it in the more important thoroughfares, but it is well to consider whether, in certain districts, a cheaper overhead system would not suit just as well. The difference in cost, according to Mr. Rider, is about £7,000 per mile. It is probable that before London requirements can be met, there will be 400 miles of single track, which means a difference in the total cost of three millions sterling. It is estimated that the conduit system for the Peckham and Greenwich line will cost over £14,000 per mile of single track, while the cost in other cities has been as follows:

	Cost per mile of single track, using new material throughout.			Overhead equipment. Cost per mile of single line for side po e construction.
	£	s.	d.	£
Leeds	5,613	13	4	364
Liverpool	5,800	0	0	500
Sheffield	5,980	0	0	766
Manchester	5,970	0	0	900
Glasgow	5,651	0	0	1,062

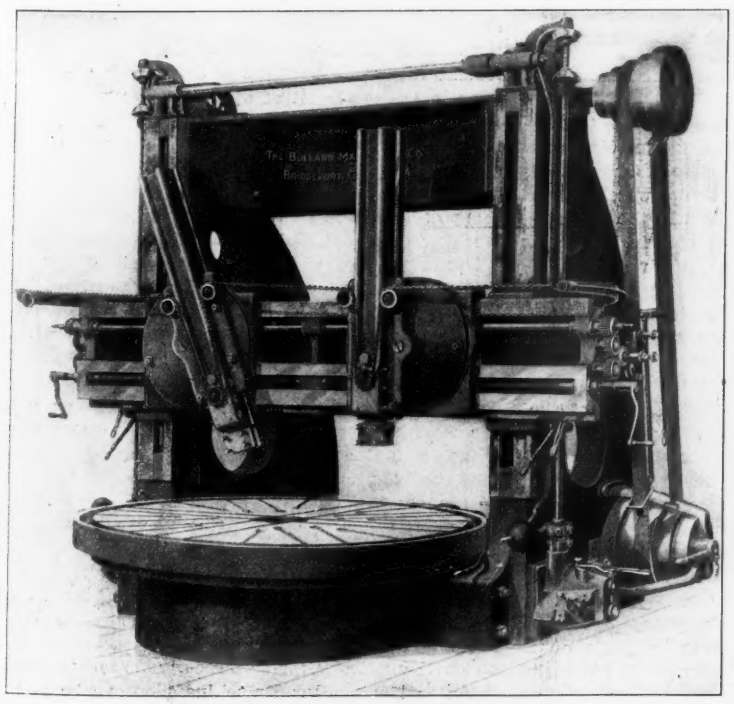
Again, it is pointed out that the cost of cleaning the conduit will be £100 per mile of single track, and that the maintenance charges for the conduit system in Brussels has been .3125d. per car-mile more than for the overhead system; and in Paris they are .6505d., against .1914d. per car-mile. The actual costs of the Tooting line are given by the Highways Committee of the London County Council as follows:

Expenditure for—	Total. £	Rate per mile. £
Rails and roadwork	224,020	13,660
Cars (6.1 to the mile)	72,500	4,420
Power station and cables	74,000	4,510
Substations	20,600	1,255
Car sheds and workshops	34,000	2,075
Incidentals, including Dr. Kennedy's commission and proportion of salaries of Council's officers	15,000	915
	440,120	26,835

Bullard Ten Foot Boring Mill.

The accompanying engraving shows a 10-ft. boring mill built by the Bullard Machine Tool Company, Bridgeport, Conn., and is a good example of modern machine tool construction. The actual swing is 123 in. and the height under the rail is 84 in. The table is 92 in. in diameter. The movement of the vertical tool bar is 48 in. and the heads are handled by power for quick traverse in all directions. The cross rail is also raised and lowered by power. The cone has five sections, the largest being 30 in. in diameter and takes a 4 in. belt. The speed of the counter is 440 r.p.m. and 15 speed changes are provided.

The spindle is 60 in. long over all and is 20 in. and 14 in. in diameter and the spindle support is 50 in. in diameter. The rail is 28 in. wide and has a bearing on the uprights 36 in. long The floor space occupied by the machine is 18 ft. 4 in. x 12 ft. 5 in. and the net weight is 90,000 lbs. The table gear ratio is 1 to 7 and the total ratio is 1 to 252. The feeds vary from $^1/_{32}$ in. to 1 in. horizontally and from $^3/_{128}$ in. to $^3/_4$ in. vertically and are all positive. The motor used for driving is 20 h.p.



Bullard 10-Foot Boring Mill.

Electric Railroad From Paris to Versailles.

The new electric railroad between Versailles and Paris was recently built to relieve the overcrowded traffic of the steam railroad to Versailles, as it was found impossible, owing to local conditions, to increase the number of tracks on the latter road. It was decided to construct a line which would have a more direct route, with a terminal station on the bank of the Seine, near the center of the city. The new line takes part of the traffic of the main lines to Brittany and Normandy, and also has a

Viaduct on Paris-Versailles Electric Railroad.

large suburban traffic, due principally to the central location of the new terminus. A large underground station has been built for the main terminus of the road, on the bank of the Seine at the end of the new Alexander III. bridge, and underneath the avenue which passes from the bridges to Les Invalides. The station has been laid out on a large scale and has a number of tracks, some of which are used by the electric road and the remainder by the steam railroad which crosses the Seine a little further down. The tracks are laid in pairs, and an elevated foot way has been built between each pair which allows the passengers to enter the cars directly.

The construction of the road within the city limits was not difficult on account of its location, along the bank of the Seine. After leaving the station, the road follows the river, as a double track line, protected by the embankment wall of the Seine. The steam railroad uses the same tracks for a part of the distance and then branches off to the right. Outside the city limits the road passes through a flat country, for the most part upon a series of viaducts and embankments, as far as the two-mile tunnel at Meudon. After passing this tunnel, the road continues on another series of smaller embankments to Versailles. The total length of the electric line from Les Invalides station to Versailles is 10.5 miles, which is a trifle shorter than the steam railroad between these points.

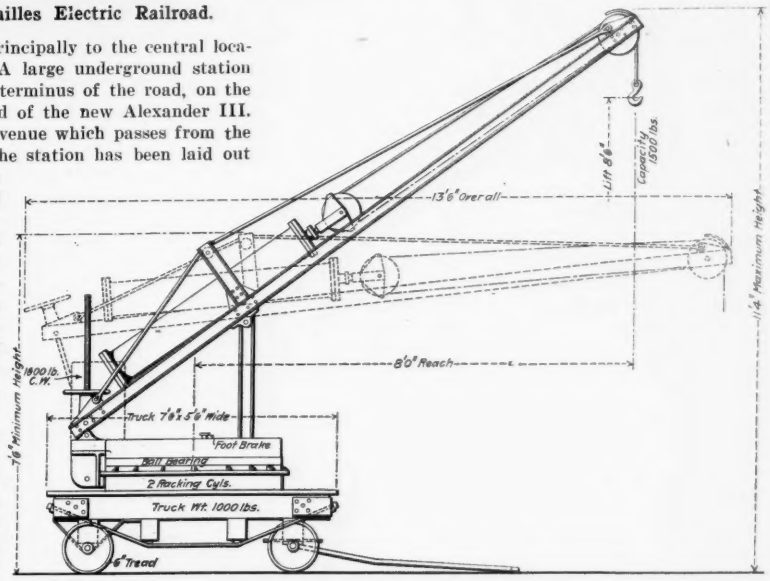
The viaduct construction was adopted because of the fact that the land through which the road passes lies just outside the city limits, and is either fairly well built up, or will be in the near future, as it is a growing district. The building of these viaducts, which represent a total length of 1.4 miles, including .445 of a mile of embankments which separate them, has been unusually difficult owing to the nature of the soil, which is a plastic clay. Below the clay is a bed of chalk which contains a series of galleries for the extraction of the material. These galleries had to be either filled up or lined with masonry. In some cases the foundations of the viaducts are at a depth of 50 ft. below the surface level. The quicksands of the Seine which exist here, consisting of fine sand, occasioned a considerable amount of trouble in making these foundations secure.

The cost of the Meudon tunnel, which is the most difficult engineering feature of the road, is estimated at $2,000,000, while the cost of building the first 6.8 miles of the road is roughly figured at $5,200,000, or $760,000 per mile.—*The Electrical Review.*

A Pneumatic Revolving Crane.

The accompanying drawing shows a special type of pneumatic revolving crane made by the Garry Iron & Steel Co., Cleveland, Ohio, which differs somewhat from the standard types made by this company in having an adjustable boom and counterweight. These standard cranes are divided into two classes, B and C, similar in design but of different capacities. Form B has a capacity of 1,000 lbs., 7 ft. reach, 12 ft. 6 in. hook lift and height from rail to top of boom of 9 ft. 2 in. Form C cranes are of larger capacity, 2,000 lbs. to 10,000 lbs., with a standard reach of 12 ft., standard hook lift 12 ft. 6 in., and height from rail to top of boom of 15 ft. 6 in. Both sizes are mounted on a heavy car and arranged for standard track gage. The gage may be altered to suit requirements or the cranes may be mounted on a special hand truck, as shown in the drawing, for convenience in moving about in storerooms, warehouses or platforms.

Unless specially ordered the crane cars are equipped with a set of rail clamps to prevent tipping when lifting the load. On special orders cranes are built with a counter balance on the turn-table as in the crane illustrated. This obviates the use of rail clamps. The cars are of extra heavy design and when built as a hand truck are fitted with four wide tread wheels. The crane base is bolted directly to the car and has a machined ball race on its upper face which contains 193 ground steel balls.



Pneumatic Revolving Crane.

In the standard types, the bottom of the base is machined to receive the cylinder rack, guides, pivot and stop. The projecting ring on the under side of the base is machined for rollers and brake. The brake bracket is attached to the turn-table and hoisting cylinder and has secured to it an air cylinder and rollers actuated by a foot valve convenient to the operator. The hoisting cylinder is securely fastened to the turn-table and brake bracket and is additionally supported on the top of the turn-table by the vertical struts. The air is applied in such a way as to permit the operator to handle the crane for all movements without changing his position. Heavy channels stiffened by top truss rods are used for the boom. Ordinarily the hoisting cable has one turn about the main sheave for hook lifts of 12 ft. or more, but this may be modified to suit requirements.

The standard type of crane can be furnished with traversing motor on the car or with hand traversing arrangement if desired. This company also makes a pneumatic crane with a trolley which racks in and out on the boom, giving four applications of power.

These cranes are particularly adapted to loading canal boats, freight cars, for coaling locomotives and all purposes requiring heavy lifting. In and about railroad shops and yards and on freight platforms they have found a large field. Each crane is tested to its full capacity before leaving the works, and the workmanship and material is the best possible.

The penetration of the Simplon Tunnel in April was increased 899 ft., and nearly one-half more on the south end (which is far behind hand), than on the north, where work was delayed by the character of the rock, which had to be supported. Work was delayed also 52 hours for the purpose of testing the accuracy of the direction of the tunnel axis. The total penetration at the end of April was 50,802 ft. leaving 13,711 ft. to be excavated.

RAILROAD GAZETTE

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EDITORIAL ANNOUNCEMENTS.

CONTRIBUTIONS.—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussion of subjects pertaining to ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

ADVERTISEMENTS.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and these only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially either for money or in consideration of advertising patronage.*

Elsewhere in this issue is a description of the electrification of a portion of the North Eastern lines in the vicinity of Newcastle, England, where suburban traffic is very heavy. The operating reports of the company do not indicate what proportion of the sixty million passengers carried in 1901 traveled in this suburban territory, but some idea of the average haul may be obtained from the fact that receipts per passenger work out to about 23 cents on the entire North Eastern system, as against 26 cents on the Great Western, and 28 cents on the London & North Western. At present, about 37 miles of single, double and four-track line are being electrified, and trains will run in units of three cars, two of them motor cars, with a trailer in between, quite like the working of our Manhattan elevated. The British railroads have been so conservative, for generations, in making changes in established practice that an innovation of this character is of especial interest. But Mr. Gibb, the exceedingly able manager of the North Eastern, has much of the American point of view in his desire to experiment and to perfect, with or without precedent. He is at present face to face with the same problem that is of grave concern to American managers as well as British—the competition of electric traction lines in a thickly settled suburban territory—and he is fighting the electric lines with their own weapons.

Superheated steam has long been a charming subject for study by those interested in improving the performance of steam engines. No one familiar with it has questioned its value, but objections to its use have been found in the high cost of its production. This cost has resulted chiefly because of the heavy charges for repairs to the superheater. Consequently, for many years past, American practice has allowed conservatism in design to hold in check the enthusiasm of the theorist, and but little progress has been made in the use of superheated steam. But now, there are indications in trials both in Europe and in America that it is a practical and valuable device. The superheated steam locomotive has demonstrated its economy over either the simple or the compound locomotive and tests recently made on the Canadian Pacific show similar comparative results to those obtained in Europe. Those who have followed recent development in this line will be interested in a series of articles, beginning in this issue, on "Superheated Steam in Locomotive Service." These, while not neglecting the theoretical aspects of the problem, are nevertheless cast in such simple form as to be readily intelligible to the non-expert. The first installment presents an elementary view of the problem. The second will include some discussion of the development of practice in the use of superheated steam in America and Europe, with special attention to the Schmidt system, while the third or concluding portion, will discuss the question as to whether the Schmidt locomotive, or any locomotive of similar design, can have a permanent place in American railroad practice.

Division officers of the Chicago & North Western, who watch enginemen to test their obedience to signals, made, in March last, 192 tests, as shown below, the inspection including both manual and automatic signals:

Division.	Tests obeyed.	Tests disobeyed.
No. 1	49	2
No. 2	13	..
No. 3	13	1
No. 4	7	..
No. 5	19	..
No. 6	19	..
No. 7	6	..
No. 8	22	..
No. 9	29	2
No. 10	3	..
No. 11	7	..
Total	187	5

Of the total, 187 signals were positively obeyed, or 97 per cent. of the total. The officer sending these figures says: "The difference in the number of tests made on the different divisions is to be explained by the fact that on some of the divisions the traffic is very light. Every one of these tests was made purposely by one of the division officials. Approximately the same number of tests is made on each division each month. On Division No. 1 it will be noted there were two tests disobeyed. Only one of these, however, was considered of sufficient importance to require any discipline to be administered and in that case the engineman was suspended sixty days. The other case was a minor one, the signal being passed by only about a car length. It was caused by an insufficient application of the air, the engineman noticing the signal and endeavoring to obey it. In the case of Division No. 3, there was only one test disobeyed, and the engineman was disciplined by being suspended thirty days. In the case of Division No. 9 there were two tests disobeyed. In both of these cases the signal was recognized by the enginemen, who brought their train under control, but did not come to a full stop on account of the fact that they had a very heavy train. The explanation in these two cases was accepted, but a severe reprimand was administered to them for not literally obeying the rules." One significant thing which does not appear until we read between the lines is that on those divisions where no disobedience was detected there are no automatic signals; while, on the other three, nearly or quite all of the block signals are automatic. In the absence of figures showing either train mileage or number of signals in service this report is of limited value; but it has the distinction, we believe, of being the first of its kind ever published. The three per cent. of failures would be increased to something over five per cent. if we were to exclude those divisions where there are no automatic signals; but, on the other hand, the percentage might perhaps be greatly reduced if we could include every train movement at every signal on the divisions which have automatics. Whatever the goodness or badness of the showing, it is, no doubt, a great improvement over anything that could be found by such a test on a road of similar character where the runners had never before been tested; for, if we remember correctly, the North Western practice was greatly improved the first few months after the testing was begun.

On one other road that we could name, a test of this kind, which was made not long ago, disclosed thirty-three per cent. of bad practice! One out of every three of the enginemen that were watched was found to disregard signals. Evidently the superintendent of that road has a tender spot in his heart for the ancient theory that men put in charge of trains must be allowed to exercise their judgment as much as possible, so that they shall not become mere machines. But that was much more than an exercise of "judgment," and the record opened the eyes of some of the officers. Consideration of these percentages naturally leads to the question of the proper number of tests per month, or per engine or per signal. In testing conductors to detect thieves, certain superintendents have believed that a small amount of watching would produce a large amount of caution on the part of the conductors. What this theory indicates in regard to the standard of honesty that is expected in conductors by such superintendents, we are not prepared to say; but it is clear that the theory is quite necessary in testing enginemen, if only 51 tests are to be made on a busy division in 31 days. A runner who expects to be tested once in two or three months must be inclined to look upon the thing as merely a scare; he has considerable temptation to take chances; to still swear by the old notion that if you make time and do not get into trouble the approval of your superiors is assured. The purpose of a test is or should be to induce enginemen to test themselves; to cultivate their habits of vigilance and their sense of obedience to orders, so that strict adherence to the rules will become habitual; and long intervals of inactivity on the part of the superintendent must be a material hindrance to this. If it is impracticable to test all of the runners as frequently as is desirable, it might be a good idea to thoroughly test and educate a few of them (rather than do half way work with a larger number) with a view to training the others through the missionary work of these few. In specifying habits of vigilance and the spirit of obedience, we do not, of course, forget that there is a third important quality—the courage necessary to coolly and intelligently face the "old man" when he demands that just as good time be made as was made under the old regime of taking risks. This, by the way, is as useful a training in the exercise of judgment as anything that can be found in the methods of old-school railroading. It takes a fine judicial quality, and a heap of thinking, to prepare oneself to make a strong defense in such a case; and, of course, you are bound to present a strong case if you present any case at all.

Electricity in Railroad Shops.

Attention is called to a number of letters in the last issue of the *Railroad Gazette* from motive power officers giving their views on the adaptability of the electric motor for driving machine tools in railroad shops. Several additional letters are given in this issue. There has been much written and said on this subject within the past few years, but a large part of the work has been overdone and not intelligently engineered. Few shops have undertaken a systematic study of the cutting speeds and feeds which are now possible with modern tool steels, and what seems to be economy is in many cases extravagance. The use of one system or the other can only be settled by those familiar with shop requirements and the conditions which affect the character of the work. The office of the railroad shop is to furnish such facilities that the work may be done in the shortest possible time and at a minimum expense. The problems of shop operation are studied with this in view. The method of driving machine tools, while important in itself, is but a part of the general proposition, and very often, no doubt, the economies which have been claimed for the motor drive have been in a large measure due to better organization, better lighting of the shop, better facilities for handling material, etc., which are the natural outcome of any change from old methods.

It is frequently said that the chief advantage of the electric motor for machine shop use is the saving in power over the old methods of driving by means of line shafting. While it may be true that this saving is considerable in a few isolated cases, it should nevertheless be borne in mind that the chief item of expense, particularly in a railroad shop, is the cost of labor, while the cost of power and the cost of material are smaller factors. The economy of a central station, the elimination of high pressure steam lines, etc., are in a large plant important factors, but unless a direct net saving is made in the total cost of operation, the use of motors in a shop already built would hardly be justifiable, on account of the heavy interest charges on the capital invested and the losses due to discarded material. The cost of power is after all "one of the cheapest commodities of the shop," and rarely exceeds five per cent. of the total cost of operation.

One advantage which has been claimed for the electric motor is the doing away with overhead line shafting and belting, thereby making a lighter and more cheerful looking shop and making possible the use of overhead traveling cranes. These arguments have much force but the writer has seen some modern shops using line shaftings and belts with the machines group driven in which the overhead crane is also used, the machines being so disposed that the belts and line shafts were not in the way of the overhead crane. For heavy work and for traversing the advantages of the overhead crane are generally conceded, but it is by no means certain that its use has not been somewhat overdone. The following is quoted from the remarks of Mr. R. H. Soule before the New York Railroad Club Feb., 1903: "The great bulk, more than half, certainly, and perhaps two-thirds or three-quarters of the tools in an ordinary railroad machine shop can be better served by local and individual cranes or hoists than by a general crane traversing the whole floor space."

The general feeling is that the advantages of the electric motor for railroad shops have been somewhat overestimated. New shops should be designed with the electric motor in view, yet its use should be conservative and a systematic and carefully planned grouping of tools in which each group is driven by a motor, will give better results than the general use of individually driven tools. Heavy tools and tools remote from any of the main shops, turntables, transfer-tables and overhead cranes, exhaust fans and conveyors can be best served by independent motors. Just where the line should be drawn is the open question. Several good authorities, experienced in shop matters, believe that all tools requiring more than 7½ h. p. should be driven by an individual motor and it is also recommended that in large shops it will be found advantageous to operate all large machine tools with independent motors and to group the smaller tools into units of not less than 25 h. p.

By using the group system induction motors can be used advantageously, as the line shaft driving each group can be turned at a constant speed which is, as is known, the best condition for efficient operation of the induction motor. Where variable speeds are necessary, such as would be the case on certain classes of individually driven machines, the direct-current motor, using one of the various control systems now in use, is no doubt the most efficient. The speed of the direct-current motor can be varied in several ways. Some makers use the rheostat for varying the strength of the field current. This method is, of course, uneconomical in power but gives a positive and simple means of varying the speed. Other makers claim merit for systems employing a multiplicity of wires with different potentials between the several wires and the speed is varied by the rheostat and by changing the impressed electromotive force at the motor terminals. This method is not applicable to alternating current motors inasmuch as the variations of impressed electro-motive force do not affect the speed of the motor within practical limits and is even then uncertain, and is likely to result disastrously. The speed of the alternating current motor can be varied by altering the frequency of the current or by changing the number of the poles. By varying the number of poles and the wave frequency it is possible to make an alternating current motor having speed variations suitable for machine shop use. There are difficulties in the way of a practical design along these lines, but it is a problem that is being studied by electrical engineers and will no doubt be solved in the future. The induction motor and the use of the alternating current reduce the cost of installation.

The motors obtainable now are so well designed for durability that little trouble is experienced and whether the direct or alternating current is used, the question still remains as to the advantages to be derived from its use in the railroad machine shop. The conditions in railroad shops are in many respects different from those in other shops. In the railroad shop the work is of a generally uniform character. That is to say, a 72-in. wheel lathe will in general be used for turning the tires of driving wheels having a diameter not far from 72 in. For the smaller size driving wheels a smaller wheel lathe will be used. The same condition holds for other parts of the locomotive. Under these conditions, the full advantages of the electric motor are not at all times realized, inasmuch as variable speed is not required. There is, of course, an advantage to be gained by reason of the ease with which a machine can be operated and in new machines the electric motor is more reliable than the belt drive for taking heavy cuts at high speeds. One motive power official believes that the principal advantage of the new tool steel lies in the fact that metal can be removed at higher speeds and not on account of the heavier cut which is possible. This applies particularly to old machines to which the electric motor has been applied without redesigning or strengthening the gear trains or spindles. For new machines properly designed this argument has lessened value.

It is rather difficult to arrive at set rules or standard practice in the use of electricity, as in each individual case the character of the work and the conditions to be met must be studied. The railroad shop is, after all, but a means to an end; namely, the expeditious repair of equipment so that its earning power may be quickly restored. If, then, the use of the electric motor will expedite the work and reduce the time of the engine or car in the shop, it will have served a useful purpose; but if the prime consideration is a reduction in the cost of power, then it is a question whether the interest and depreciation on the additional investment will more than offset the economies derived from the use of the electric motor. The entire question is one of importance in view of the present activity in shop building. Old shop facilities have become inadequate, due to the rapid increase in the size and capacity of locomotives and cars during the past few years, necessitating the rebuilding of many old shops in order to accommodate the heavier equipment.

Rate-Making in Texas.

Can any good thing come out of Texas? "Is Saul also among the Prophets?" As far as railroad legislation or regulation is concerned, most people would answer no. The Legislature of the State, which for many years has looked on the railroads as enemies; and the State Railroad Commissioners, who have made feeble and usually ineffective attempts to be just both to the railroads and to the farmers, have written so much unwisdom that one scarcely looks for anything worthy of attention from those sources. But the conservatism of the judiciary still remains, even in Texas, and the Supreme Court of the State has lately determined two principles which must agitate the State from stem to stern—if we may use a bit of the politician's rhetoric. In a decision refusing to order the Railroad Commission to make rates for cotton in round bales lower than those for square bales the Court says that the Commission has a wide discretion; that it cannot be required to make all rates exactly just, as related to other rates, because that is impossible; that "rates must sometimes be made abnormally low, to give support to weak enterprises"; and that "there is no precedent or principle by which the reasonableness of a rate . . . can be determined by a comparison of profits from different classes of freight." The points which we have put in quotation marks are familiar commonplaces among men who actually make rates; but to have them uttered by a non-railroad authority, and in such an atmosphere as that of Texas is encouraging. If the newspapers of the State will give to this the same prominence usually given to sensations the intelligence ought to produce a salutary coolness in the hot brains of the legislators.

The case was that of the Railroad Commission vs. Weld & Neville (73 Southwestern Reporter, 529). The parties who brought it asked the Court to fix upon cotton in round bales, compressed to a density of 40 pounds and more to the cubic foot, and which were alleged not to be breakable, combustible, or liable to injury by water, a rate lower than that which had been fixed by the commission upon cotton of all classes. They claimed that the commission had failed to give them an advantage over their competitors; and that this was unjust because it deprived them of a benefit which they ought to derive from the control of improved machinery, and because the railroad company could make more profit on a carload of round bales.

But the Court holds that to make such a difference between flat bales and round would be unjust discrimination; it was proper for the commission, in making rates, to bear in mind that the probable effect would be the creation of a monopoly to the detriment of the public. The owners of improved machinery have a right to the benefits of its superiority that come from the use of the machinery itself, but they have no right to ask the government to bend its policy to their aid in this respect to the injury of other citizens.

The performance of the prescribed duties of the Railroad Commission, in fixing rates and making classifications, the Court says, requires that classifications be made so as to secure equality as near as may be in the carriage of similar articles, and each shipper is entitled to have his property carried for a reasonable compensation for the service rendered to him. In making the classifications and rates of charges, the railroad companies must also be protected in their right to have a fair return from their business; but in determining this question the Railroad Commission must have in view the entire business operations of the railroads. A marked difference between the right of the shipper and of the carrier in determining the reasonableness of rates consists in this: When considered from the shipper's standpoint, it must be reasonable as to the particular property carried; that is, the charge must not be more than a fair compensation for the services rendered to the shipper in the carriage of the particular property. When, however, the commission considers the reasonableness of rates from the standpoint of the railroads, it is not confined to the particular article, but must look to the whole business of the railroads. The railroads are required to carry many articles at a loss as a single transaction, and this must be made up by levying a higher rate upon such articles as can bear it, within the limit of reasonable compensation. The rate and classification must be so arranged as to give a result of just and reasonable compensation on the entire business of the railroad company. The rate of each article need not be reasonable if considered alone, but the aggregate must produce a reasonable return. The work of the commission involves a comprehensive knowledge of the business transactions of railroads and of the various business interests of the people.

By a just exercise of their ample powers the citizen is to be guarded against extortions and unjust discrimination, and the railroads allowed a fair return for the services rendered to the public. "Public interest must be consulted in the fixing of rates and making of classifications so as to give support to weak enterprises, and not to exclude from market many things which would not bear transportation if the charges were based upon absolute equality. The superficial view of the subject which the court is able to take with its limited knowledge makes it manifest that discrimination in rates is often necessary to uphold justice and to promote the public good, and such discrimination is not unjust to him who gets in service the equivalent of what he pays."

"There is no rule of the common law nor provision of the statute which requires the carrier or the commission to make rates based upon carload lots, nor is there any precedent or principle by which the reasonableness of a rate (as it affects individual shippers) made by carriers or by the commission can be determined by a comparison of the profits derived from the shipment of different classes of freight."

This last principle might well have been laid down without the qualifying clauses; that is to say, there is no principle by which the reasonableness of a rate can be [precisely] determined, from any point of view. The final decision must be an arbitration, just as much as the fixing of the price in a horse-trade. In both the horse trade and freight transportation the price should, after reasonable discussion, be acceptable to both sides; but no one can declare that a given result is equitable in either case; it would require too much hair-splitting.

The Court's reference to the "marked difference" between the railroad's rights and those of the shipper shows the difficulty. On the whole subject of reasonableness, indeed, the Court is wading in pretty deep water. It has to leave the subject just where all the rest of us have to leave it; and in view of the attitude of the citizens of Texas, and the temptation to try to answer unanswerable questions, it is matter for gratification that the Court does thus refrain from attempting the impossible.

In the *Railroad Gazette*, June 13, 1902, there was described in detail the scheme of repairing locomotives by schedule used at the Chicago shops of the Chicago & North Western; and one of the schedules was shown. The scheme embraced three schedules of 8, 16 and 21 days respectively, depending on the nature of the repairs. The average monthly output up to that time had been 32 engines, with one month, April, 1902, showing 33. The statement was made that it was expected to bring this up to 35 as soon as improvements then under way were completed. Not only has this expectation been realized, but it has been largely exceeded, April of this year having a record of 42 to its credit. This increase has been due chiefly to the use of new tools and the more perfect working of the schedule system; the more efficient organization of the shop forces has also been an important factor. The increased output has been accompanied by a reduction in schedule time, it being quite usual now for engines on the 16 and 21-day schedules to come out two days ahead of time. When it is known that this is accomplished in a 21-pit shop without overhead traveling crane facilities, the performance appears remarkable.

TRADE CATALOGUES.

New York to Newfoundland, by Marian Varian. The building of Reid's Newfoundland railroad has lately made accessible a vast region where men have never before been, and developed a great wealth of spruce, pine and minerals, as well as a hunter's and fisherman's paradise. It is ready for exploitation and doubtless there will be a good deal of it. Meantime, Miss Varian has discovered it, for her pamphlet is written with the enthusiasm of a discoverer, and she tells exactly what she saw in a brief visit, with no material obtained from guide books, and it is all evidently true. It is as charming as an honest autobiography. Newfoundland is a country of opportunities of many kinds that have not yet been seized, and it is worth watching.

Catalogue No. 24 of the A. Leschen & Sons Rope Co., St. Louis, Mo., is being mailed to the trade. It is an 80-page pamphlet giving full details regarding the various kinds of steel and iron wire rope, hawsers and cables made by this company; also hooks and fastenings, thimbles, shackles, clamps, turnbuckles, etc. A line of blocks and sheaves is shown, and in the back is given some useful information as to rope transmission, speed, splices, etc. Also some space is given to the Leschen Co.'s system of automatic aerial wire rope tramways.

Kaltenbach & Griess, Cleveland, Ohio, consulting and contracting engineers, have published a catalogue in which are described a number of specially designed machines for concrete work, including their K. G. cube mixers. This type of mechanical mixer is adapted to any material and does the work in a most thorough manner. In many cases it is specified as the only type of mixer allowed on a job. A number of excellent reproductions from photographs show some of the complete plants installed for work on important engineering projects.

Asbestos Roofing, is the title of a pamphlet sent out by the H. W. Johns-Manville Co., New York, describing a number of the standard brands of prepared roofings made by that company. It is illustrated with a number of photographs of buildings on which this material has been used.

Four Track Series No. 8, of the New York Central, has been revised for the season of 1903. It contains a

brief description and the necessary information for the summer tourist of a number of vacation tours over the company's lines.

Stickney Junior, a 3 h.p. gasoline engine, is described and illustrated in an attractive little pamphlet sent out by Charles A. Stickney Company, St. Paul, Minn.

Master Boiler Makers' Duties.*

My 17 or 18 years of experience, and very largely in connection with locomotive work, makes it possible for me to attest to the ability and high character of the work that has been performed in this country by the Master Boiler Makers. The association is a young one, this being the second annual convention, and it has before it possibilities of great usefulness. There are two important things that men in your position have in charge. First of all, the most important thing you have in charge is men. You should remember that you have attained your position through your own efforts very largely, but also partly through the opportunities that you have received at the hands of others. You have risen to a position where you are in charge of others, and the highest duty that you can perform is to perform your duty toward those who are subordinate to you, as well as those who are superior to you. The greatest service that you can perform both to your country and your profession, is to try to exercise your influence toward making upright men. You always realize the necessity of having good men in your employ. Whether you will have good men or not in your employ, and whether you will have skilful men in the future, depends upon what influence you are going to exert yourself. I feel confident from my personal acquaintance with you good men here, that you will perpetuate the high degree of skill and character that has brought the industry of locomotive boiler makers up to its high degree of efficiency.

You undoubtedly realize that there are a great many perplexing questions in connection with men. It seems to me that you who are directly in charge of men have it in your power, more than almost any one else, to maintain between those who are subordinate to you and those who are superior to you, relations that we all know should exist. I feel that you could do no higher or better work than to devote some portion of your time, at your work every day, in promoting that relation. It is more important to-day than ever.

In connection with your technical work, my experience carries me back to the time of wrought iron fire-boxes and wrought iron boilers, and I remember well all the difficulties we used to experience, particularly in this part of the country where we had bad water conditions to deal with, in connection with boilers, and I remember well, a great many years ago, the first steel boiler construction we had in this country. It was thought by everybody that steel was entirely out of the question, and there is no doubt that steel in this country was not entirely satisfactory. The use of steel, however, has made possible some things in boiler construction that we never dreamed of. Two hundred and twenty-five pounds pressure was never dreamed of. The capacity of the boiler has received its high development almost entirely through the ingenuity that has been exercised in the manipulation of steel. The large boiler constructions of to-day were thought to be entirely impossible 15 years ago.

*From an address by Mr. S. D. Bush to the International Master Boiler Makers' Association convention.

TECHNICAL.

Manufacturing and Business.

The Kennicott Water Softener Co., Chicago, has secured the services of Prof. W. M. Bruce, formerly of the University of Chicago. Prof. Bruce assumed full charge of the laboratories of the company on June 1.

The Philadelphia Pneumatic Tool Co. reports a great increase in its sales for May over any previous month this year. Large orders have been received for both foreign and domestic shipment and many new customers have been added to the company's list during May. The demand for the Keller rotary drills and riveting hammers is particularly noticeable.

Pawling & Harnischfeger, Milwaukee, Wis., builders of traveling cranes, have leased and equipped the old Nordberg shops to replace their erecting shop burned on April 15th, and have placed them in as good shape to build cranes as before the fire. They report a large volume of business and good prospects for the coming months owing to the large number of new railroad shops which are now planned.

The London County Council at a recent meeting closed a contract with the British Westinghouse Company, amounting to about $590,000, and calling for 200 tram cars which are to be used on its lines south of the Thames. This is the largest order ever given for electric cars in England. One-half of the cars are to be of the single-truck type. The remaining 100 will be double-deck, bogie-truck tram cars, which are to be delivered in 28 weeks.

The 20-stall roundhouse of the Norfolk & Western at Portsmouth, Ohio, has been equipped with the hot blast system of heating, the apparatus consisting of a large exhaust fan direct-connected to a horizontal engine and drawing air through a steam-coil heater built up of 1-in. steam piping on cast-iron sections. Air is distributed throughout the roundhouse by brick flues and galvanized iron piping, so arranged that heated air may be delivered into each engine pit. The equipment was designed and installed by the B. F. Sturtevant Co., Boston, Mass.

The Pressed Steel Car Company of Pittsburg has made and shipped up to and including May 29, 1903, 100,467 cars. This figure represents the actual number of cars which are in service to-day manufactured by the Pressed Steel Car Company, and includes both steel cars and wooden cars for which steel underframes have been furnished. This company has, for some time past, shipped over 120 cars a day from its McKee's Rocks and Allegheny shops. In the manufacture of these cars from 45,000 to 50,000 tons of steel plates are used monthly. From the present outlook all previous records in car building will soon be eclipsed; as it is estimated that more than 38,000 finished cars will be made this year. Besides cars, orders are in hand for a large number of pressed steel body and truck bolsters and freight car and engine tender trucks as well as other pressed steel specialties for wooden and steel cars.

Iron and Steel.

The Erie Forge Co., Erie, Pa., has been reorganized and the capital stock increased from $100,000 to $150,000.

The Minneapolis Steel & Machinery Co., Minneapolis, Minn., has increased its capital stock from $500,000 to $750,000.

The New York Central & Hudson River R. R. offers for sale nearly half a million dollars' worth of second-hand bridges. Some of the material has already been taken out of track.

The Fitzhugh-Luther Co., Chicago, Ill., with $250,000 capital, has been incorporated by Carter H. Fitzhugh, Frederick P. Luther and Silas H. Strawn, to make locomotives, cars and machinery.

The Woodward Iron Co. of Woodward, Ala., has elected the following officers and directors: J. H. Woodward, President; R. H. Banister, Secretary; S. Hine, Treasurer; G. B. McCormack, A. H. Woodward, W. T. Bert, J. M. Vance, F. J. Hearn and S. Woodward.

The Dover Forge & Iron Co. has been organized at Canal Dover, Ohio, with the following directors: Ambrose Beard, F. H. Waldron, A. Weiss, H. W. Enck, James Rees, L. P. Wentz, C. F. Baker. The officers are as follows: A. Weiss, President; H. W. Enck, Vice-President; Ambrose Beard, Secretary, and Chas. F. Baker, Treasurer.

Henry A. Callan, Western Representative of the Latrobe Steel Company, died at his home in Chicago Sunday, May 31. He was 51 years old and had been with the Latrobe Company for seven years, previous to which he was with the Chicago Tire & Spring Co. He had been in ill health for some time and for the last few months was able to give but little attention to business. He was buried in Chicago on June 2.

The American Frog & Manufacturing Co., Kansas City, Mo., is in process of organization under the laws of Missouri, with a capital stock of $250,000. The plants of the Cookson Manufacturing Co. and of the Kansas City Switch & Frog Works, in East Kansas City, have been bought and the new company has in course of erection on the property a complete switch and frog works, foundry and machine shop. The product will include frogs, crossings, switch points, switch stands, track materials and tools, forgings, and gray iron and brass castings. The company will also handle general railroad supplies and material. The officers are: F. W. Fritchey, Vice-President and General Manager; W. G. Humphrey, Secretary and Assistant Treasurer; J. E. Murphy, Manager of Sales. The general offices are at 302-303 New England Building, and the factory and store rooms are at 19th street and Manchester avenue.

Contract for Field Guns Going to Germany.

On recommendation of Gen. Crozier, Chief of Ordnance, the War Department has let a contract to the Erhardt Company, of Dusseldorf, Germany, for 50 modern field guns with carriages and limbers. Two hundred and fifty of these guns are needed, and most of them will be built in this country, but in order to get the quick delivery desired (7 months) it was found necessary to order some of the guns abroad.

The Block Signaling of the Subway.

The contract for block signaling the Interborough Rapid Transit Railway in New York has been awarded to the Union Switch & Signal Company. In the amount of money involved this is the largest contract for automatic block signaling ever let at one time. The conditions are in many respects novel, and the work will require new design and even invention in method and in detail. The Westinghouse electro-pneumatic system will be used, but the apparatus will be much modified. No date has been fixed for the completion of the work.

Boiler Notes.

Great care should be taken to lay out the holes in boilers, and drift pins should not be used, but holes should be reamed. The holes when drifted upset the metal, causing the sheets to spread and making a burr on the outside sheet on top. Boilers should be tested with hot water and calked tightly while pressure is applied. I have known cases where the hot water test has developed leaks which did not show when steam was up. When tested and calked with steam pressure up the small leaks would not show on account of the evaporation by intense heat of boiler.—*From a letter by Mr. F. W. Shupert, presented at the Master Boiler Makers' Convention.*

Automatic Signals on the Michigan Central.

On the Michigan Central Railroad, with 559 automatic signals, on 279 miles of road, the number of signal failures and train delays reported by the signal inspectors in the month of April was 31. The causes of these failures and delays were: Wet track, 4; broken rail, 1; lightning, 2; broken wire, 9; defect in relay, 1; failure of battery, 1; train in block, 1; other causes, 12. No false clear indications were reported. The average number of failures and delays for the four months preceding April was 19¼ each month.

The new automatic signals just ordered by the Michigan Central will be put up this summer between Windsor, Ont., and Woodslee, Ont., 22 miles, and between Marshall, Mich., and Augusta, Mich. On the Canadian section most of the block sections will be two miles long and the distant signals will be on posts separate from the home signals and situated 3,500 ft. in the rear of the home signals. There is a length of about 66 miles on the Michigan Central on which the signals are now arranged in this way.

The Functions of Reheater Coils.

In a paper before the New England Cotton Manufacturers' Association, Mr. George N. Barrus gave the result of some tests with the reheater on three different compound engines. It was shown that the reheater reevaporates a portion of the condensed steam coming from the high pressure cylinder and thus increases the volume of working fluid passing through the low pressure cylinder. Where sufficient reheating surface is provided the steam is superheated slightly on its way from the high to the low pressure cylinders, which will in turn reduce the cylinder condensation in the low pressure cylinder and result in a higher efficiency of the entire engine. This added efficiency is not realized, however, unless the drains from the reheater coils are returned to the boiler as the heat otherwise lost offsets the gain. The chief advantage of the reheater coils is the increase in power of an engine of given dimensions by their use. In the three tests above noted the average increase in capacity was slightly over 7½ per cent. The conclusion to be drawn is, that an engine without reheater coils must have larger cylinders than an engine with reheater, if the power is to be developed in each case.

Patching Fire-Boxes.

The following is from a report to the Master Boiler Makers' Convention, by Mr. James Murry, of the Wabash:

To patch a fire-box of an engine using good water is an easy task; but to patch a fire-box of a high pressure engine using bad water is a very difficult job in order to get good results; but in the latter case the method which has proved to be the best in this class of engines using bad water is as follows:

1st. After cutting out the patch, leave not more than ¾-in. lap from center of hole.

2d. Space rivet holes 1¾ in. center to center.

3d. Use ¾-in. rivets.

4th. Use a very light strip of sheet copper 1½ in. wide between patch and fire-box sheet, holding center of copper strip at center line of rivet holes.

5th. Leave not over 1 in. of lap on patch after the same is riveted.

6th. Patch should be at least ⅛ in. thick at bottom of counter-sink. The head on the rivet should be high and should not spread more than the width of counter-sink. In some cases small patches are applied on large engines with patch bolts, using ⅞-in. patch bolts, in order to get the strength in the head of the patch bolt, as smaller sizes are too weak; but in applying large patches riveting is preferred.

THE SCRAP HEAP.

Notes.

In a butting collision of freight trains on the Southern Railway near Bryan, Ala., on the morning of May 27, eight trainmen were killed; three enginemen, four firemen, and one brakeman.

The "Brotherhood of Freight and Baggage Men of America" has been organized at Lancaster, Pa. The officers are: President, Robert J. Neil, Lancaster; Secretary, Robert P. Rupley.

The Pennsylvania Railroad has appropriated $300,000 for putting up new telegraph lines in the place of those of the Western Union Telegraph Co. which have been destroyed. It is said that the pole lines are designed to carry the wires of the Postal Telegraph Co., the poles however, to be in all cases owned by the railroad company.

Judge Lacombe, in the United States Circuit Court, at New York, has granted an order against the defendants in the complaint of W. R. Hearst against officers of the anthracite coal carrying railroads, to show cause why they should not answer certain questions propounded in the investigation of the complaint by the Interstate Commerce Commission. The order is returnable on June 10.

Civil Engineers for the Navy.

A Naval Board consisting of Civil Engineers R. F. Peary, Frank T. Chambers, Fred Thompson, Leonard M. Cox and Charles A. Wentworth will meet June 8 in New York to examine candidates for appointment

as Civil Engineers in the Navy to fill five existing vacancies to which appointments will be made.

New Naval Ships.

Bids will be opened at the Navy Department on June 23 for the new gunboat "Paducah," a sister ship to the "Dubuque," for which contract has been let to the Gas Engine & Power Company, of Morris Heights, N. Y.

Plans have been completed for a wooden sailing brig to be built at the Navy Yard, Portsmouth, N. H., to cost $50,000, and to be used as a training ship for enlisted men. The brig will be built of yellow pine and white oak and will be 126 ft. long and of 350 tons displacement.

Fast Hudson River Steamboat Time.

The steamer "New York," of the Hudson River Day Line, made a run between New York and Poughkeepsie on May 28 which appears to be the fastest time for a considerable distance ever made by a regular passenger boat on the Hudson River. The steamer left its pier at 22nd street, New York, and the time was taken when under headway, at 42nd street, thus giving the racer the advantage of a running start. The time to Poughkeepsie, about 73 miles, as the channel runs, was 3 hrs. 2 min. 37 sec. The average rate for the whole distance was 24 miles an hour. It was the first run of the season and the party on board was in charge of Mr. W. B. Elmendorf, general agent of the line. The fastest previous time over the same course was about 8 min. longer and was made by the steamer "Albany" on October 22, 1880.

New Generators for the Niagara Falls Power Co.

Six of the eleven generators have been installed in Power House No. 2, recently built for the Niagara Falls Power Co. The generators are of 5,000 h. p. each, and the ones already installed are somewhat similar in outline to those in the Power House No. 1, previously built. The collector rings, however, are placed at the bottom, instead of at the top of the dynamo shaft. The new generators are of the external-field type, with the nickel-steel revolving magnet ring, and are wound for 2,300 volts, two-phase, 25 cycles, at 250 revolutions per minute. The remaining five generators, yet to be installed, will be of the same capacity, speed and voltage, but will be of the internal revolving-field type. When Power House No. 2 is completed, the combined capacity of the plants will be 105,000 h. p., constituting the largest hydro-electric plant in the world.—*Western Electrician.*

You Mustn't Wrest a Rest.

The Supreme Court of Georgia holds that regulations forbidding the use by passengers of benches as beds, or any other attempted transformation of a railroad waiting room into a lodging house, do not tend to deprive them of inalienable rights, and are not for any other reason to be regarded as despotic and unreasonable, in a city where travelers may, if they wish, procure suitable accommodations for rest and comfort. In the case of the Central of Georgia vs. Motes (43 S. E. Reporter, 990) it is held that a railroad company is not unreasonable in adopting a regulation whereby a passenger is not admitted to its waiting room until an hour or so before the departure of a train. If the waiting room is kept open all night, permitting passengers to enter at any time, it is fair to make the condition that they shall not abuse the privilege by undertaking to wrest from the carrier a night's sleep to which they are not entitled.

Condition of the Cotton Crop.

The *Journal of Commerce and Commercial Bulletin* has investigated the acreage planted in cotton this season; the condition of the plant, and the progress of farm work. An increase of slightly less than 1 per cent. in the acreage planted is reported; there is a decrease of 17 "points" (on a scale of 100) in the estimate of the condition of the crop, and it is judged that the season is from two to three weeks late. The compilations were based on about 1,300 individual replies from correspondents representing nearly every county in the important cotton States, and these correspondents are banks, bankers, commission merchants, mills, etc., including only a few growers, in order that the returns might be free from partiality. The estimated planting for 1903-1904 is 28,102,752 acres; an increase of 224,422 over the year previous, and the average condition of the crop is reckoned at 75, as against 91.9 last year, reported by virtually the same correspondents.

Railroad Needs in India.

The report of Mr. Robertson, the specialist who was selected by the Secretary of State for India to examine the whole question of the working of Indian railroads, is on right lines, and we trust it will not be shelved. It means commercialism versus militarism and red-tapeism. It recommends that an independent board, presided over by a member of the Viceroy's Council, should control all the railroads. It condemns the present system generally, but not the men. It urges cheaper fares and quicker traveling. Mr. Robertson would replace the consulting engineers by inspectors with greater powers, and thinks that the agents of the lines should have the same powers as the managers of the State lines. He would prefer to see all the lines worked by companies. It needs no extensive acquaintance with Indian railroads to feel that this is the mere minimum of what is really wanted to give the railroads of India a fair chance. Their comparative success in the face of manifold obstacles is but proof that good material is there if properly utilized.—*Herapath's Journal.*

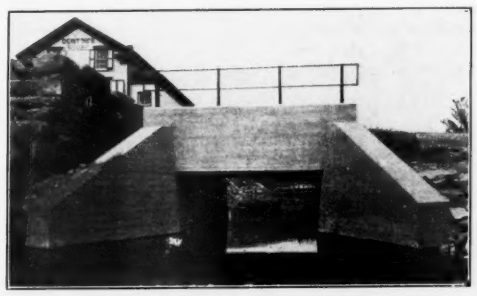
A Remarkable Switch.

The following letter, which is from the inventor of a new switch, and is faithfully reproduced, shows that the English language, as well as the matter of switch design, is subject to new ideas.

Gentleman I want to interduce and inform of a divice of a patent in Rail road switch which was granted to me July 1, 1902 the no is 703,772. it is one of the most usfullist divice has ever come before the railroad co its Specifications is as follows. The train extracts the switch with out stoping doing away with the lock and key as the old rule is the lock and key one of the most time making devices yet ever bin discovered simply notice the display of this divice a train cand side track any where and when to avoid recks and coleasons simply in one minuett's warning as the engineer has the power all in his own hands you Gentleman can ajust What I have and in a minuett by the . . . and company as thay are my attorneys and thay can explain this too you if you can handle this divice you can have the first opertunity or otherwise you can deal individgly with me as I hope to hear from you soon I remain, . . .

A Rail-Concrete Culvert.

We printed, on May 22, a description of the concrete masonry made on a foundation of old rails, now being used by the New York, Ontario & Western. The culvert



here shown was built in the same manner, and is considered as fine a piece of masonry as has yet been put in by the railroad. It serves as a small highway bridge, and is located at Summitville, N. Y.

Great Floods in Kansas and Iowa.

A disastrous flood swept through the valleys of the Kaw and Missouri rivers last week, resulting in much loss of life and destruction of property. The rivers began to overflow their banks on the evening of May 31, and the surrounding country was soon under water. Kansas City and Topeka were the principal sufferers, and many square miles of these cities and their suburbs were completely inundated. Scores of people were drowned, 48 in Topeka alone, and the property loss aggregated millions. Communication with the flooded districts was at first entirely cut off. Many important bridges were swept away, and railroad connections broken for several days. The water supply of the cities was partially shut off, and electric light and gas plants were rendered unfit for service. The principal railroads affected were: Atchison, Topeka & Santa Fe, Union Pacific, Missouri Pacific, Wabash, Chicago, Rock Island & Pacific; Chicago, Burlington & Quincy, and Chicago & North Western. The rivers reached their high water-mark on June 2, and the water then fell. The Des Moines River also rose to an unusual height, and in the city of Des Moines thousands of people were driven from their homes.

Rates on Railroads Owned by Shippers.

Splitting hairs about dividing rates with shippers appears to be a favorite pastime in England, as well as in Mississippi and other places, as witness the following from *Herapath's Journal*:

The Railway Commissioners gave judgment recently in the through rate case of the London and India Docks Company. The latter own the usual dock rails and sidings, and they held that this fact made them a railroad company. The Court, on the first hearing, held that the applicants were a railroad company, but the Court of Appeals reversed that decision. The dock company then brought a fresh application, as owners of a portion of the London Blackwall and Millwall Extension Railway, with which they had made the necessary connections to form a continuous railroad from their sidings, besides having erected a station and constructed a goods siding. An adjournment took place for the production of evidence as to whether an exchange of traffic at the dock sidings could be "reasonably and practically" effected. At the subsequent hearing the Commissioners held that the evidence tendered on this point was not such as they had desired, and they refused an application by the dock company for a further adjournment. This means a verdict in favor of the Midland and the Great Eastern companies. The principle is an important one, and it is to be hoped this case will finally decide it.

Time-Table of the Chinese Eastern Railroad.

The Russian Official Railroad Guide at last announces a regular train service over the Chinese Eastern Railroad. Beginning June 1 an express train will leave Manchuria (the Chinese border station on the west) for Vladivostok and Dalni (Port Arthur) every Saturday and Tuesday at 10 p. m., and arrive at Dalni at 7 a. m. and at Port Arthur at 9:50 a. m. on the following Wednesday and Saturday. This makes the journey to Dalni, 1,165 miles, 81 hours long, or at the average rate of 14.4 miles per hour. The road, it must be remembered, will be under construction for some 18 months yet. A stop of 1 hour 16 minutes is shown at Kharbin, where the Sungari is crossed (probably by ferry), another of 1 hour 50 minutes at Grodekevo, 358 miles further on the line to Vladivostok, and one of 48 minutes at Dashichan, 210 miles north of Dalni. Port Arthur is 20 miles further than Dalni, which latter is wholly new and is intended to be the true Pacific terminus.

The line to Vladivostok extends east from Charbin 484 miles, while the Dalni line extends southward from Kharbin 585 miles.

Going west trains leave Dalni at 11 p. m. Tuesdays and Saturdays. The time to and from Vladivostok is 8 hours less than to and from Dalni.

The Russian mails will take this route to the Pacific, but special contracts must be made for the carriage of foreign mails at special rates, which are also required for carrying foreign mails from the Atlantic to the Pacific across America.

Like Old Times.

In the midst of the machine-methods of modern impersonal railroading, where not only locomotives but men are pooled and standardized; engines made to wear black and to run indiscriminately on either freight or passenger, and conductors made to wear uniform neckties; it is momentarily refreshing to come across a modern example of the fashions of the good old days, when a regular passenger was sometimes "trusted" two days for his fare, and when the runner even ventured occasionally to carry a passenger in the cab without the special sanction of an Act of Congress. Such a reminder appears in the New York *Tribune* of May 30, as follows:

Twenty years ago the Lackawanna Railroad started a morning express from Morristown, N. J., to New York, for the benefit of men who did not have to get to their offices until between 9 and 10 a.m. To that run David Sanderson was assigned as conductor and Benjamin Day as engineer. The train grew in popularity, and now is known as the "Millionaires' Express." It carries two club cars for the wealthy residents of Madison, Summit and Morristown. It leaves New York at 4 p.m., and the same crowd travels home on it that goes down.

In recognition of the 20 years of service of Conductor Sanderson and Engineer Day the members of the "Commuting Club," which makes use of the train, on Friday evening last presented to the engineer and conductor gold watches and engrossed sets of resolutions. Alexander H. Piers, Richard A. McCurdy, H. McK. Twombly and President Truesdale of the railroad company spoke. A luncheon followed the presentation. At the same time the wives of the club members entertained the wives of the engineer and conductor and presented to them $75 in gold. Among the men in the club are John I. Waterbury, Charles F. Cutler and John Claflin.

MEETINGS AND ANNOUNCEMENTS.

(For dates of conventions and regular meetings of railroad associations and engineering societies see advertising page xvi.)

Engineers' Club of Philadelphia.

A business meeting will be held June 6, at 8 p.m. Mr. Henry G. Morris will present a paper on "A Consideration of the Gaseous Fuel Problem." This will be the last meeting before the summer recess.

Car Accountants' Association.

The 28th annual convention of the International Association of Car Accountants and Car Service officers will be held at Chateau Frontenac, Quebec, June 16 and 17. Special sleeping cars will be run from Chicago over the Grand Trunk at 8.15 p.m., June 12, and from Buffalo (Lehigh Valley Station) at 6.20 p.m. the 13th. Applications for berths should be made to Mr. F. M. Luce, of the Chicago & North Western, at Chicago, and to Mr. L. G. Corcoran, of the Pennsylvania (Secretary of the Association) at Buffalo. On the return trip the special sleepers will be run over the Canadian Pacific from Quebec to Toronto. The Richelieu & Ontario Navigation Co. offers the members a steamboat ride from Toronto or Kingston to Montreal. The railroads will give the members a carriage drive around Montreal on the 15th; and after the close of the convention the Intercolonial invites them to Halifax, N. S.; Sydney, C. B.; Prince Edward's Island, and other places.

The principal subject for discussion at the meeting will be "Per Diem," and the reports of the committees will be found in other columns of this issue.

PERSONAL.

—Mr. John T. McQueeney, for a number of years Division Superintendent on the Galveston, Harrisburg & San Antonio, died recently at Los Angeles, Cal. Mr. McQueeney was born in Saugerties, N. Y., in 1853 and entered railroad service in 1868. From then, until he took the Division Superintendency of the Galveston, Harrisburg & San Antonio (which position he resigned about a year ago), he was engaged as operator on the Kalamazoo & White Pigeon, the Lake Shore & Michigan Southern and the Grand Rapids & Indiana, and as train despatcher on the G., H. & S. A.

—Mr. Henry C. Draper, until recently Consulting Engineer of the Mississippi Valley Trust Company, St. Louis, Mo., died May 23. He was 55 years old and most of his life was spent in railroad service, which he entered in 1868 as a rodman on the Louisiana & Missouri River. In 1876 he became Division Engineer on the Chicago & Alton, and continued in that capacity until

1892, when he was made Chief Engineer. In 1900 he resigned to go to the Missouri Pacific. He was with the Mississippi Valley Trust Company from January, 1902, to October, resigning in the latter month on account of ill health.

—Mr. C. W. Werst, late General Foreman of the locomotive department of the Atchison, Topeka & Santa Fe at San Bernardino, Cal., has been appointed Acting Superintendent of Machinery for the El Paso-Northeastern at Alamagordo, N. Mex. Mr. Werst was born in Ohio in 1867. He began work as a machinist in 1883 for the St. Joseph & Council Bluffs. Five years later he was made gang foreman of the St. Joseph Terminal Association and has since been connected with different companies in various capacities. He was for about two years with the Wiggins Ferry Company, and still later was with the Baldwin Locomotive Works, where he remained until his new appointment as above.

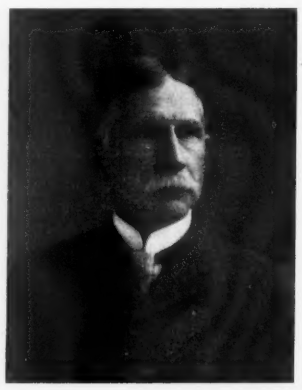
—Mr. George W. Boyd, who has been promoted to be General Passenger Agent of the Pennsylvania Railroad to succeed Mr. Wood, was born at Indianapolis, Ind., in 1849. His early railroad experience was on the Cleveland, Columbus, Cincinnati & Indianapolis. He entered the service of the Pennsylvania in 1872, serving as cashier of the passenger department, chief clerk in the passenger department and Assistant General Passenger Agent. This latter position Mr. Boyd has held for the past 21 years, and it has been a peculiarly harrying one. To be the buffer between so great a corporation and its enormous body of critical customers has needed in full all those qualities which make the timber for a foreign minister in the diplomatic service. He has fulfilled this need and much more. He has been a real student of the art of passenger transportation and has been a powerful factor in developing this department of the greatest passenger carrying corporation in this country.

—Mr. George D. Dixon, who has succeeded Mr. Joyce as Freight Traffic Manager of the Pennsylvania Railroad, was formerly Assistant General Freight Agent. He was born in Philadelphia in 1857. His first business experience was in the service of the Pennsylvania Warehousing and Safe Deposit Company, but ill health compelled him to resign. After a few years' rest he took a position in the general freight department of the Pennsylvania and filled different positions until he became chief rate clerk. In 1894, he was made Division Freight Agent at Baltimore, and in 1899, was made Assistant General Freight Agent, the position he now resigns.

—Mr. W. H. Drayton, Jr., who for the past four years has been Division Freight Agent of the Northern Central, has resigned to become General Freight Agent of the Long Island Railroad, with office at New York City. Mr. Drayton was born in Philadelphia in 1860. His first service on the Pennsylvania was as clerk. He served in different offices until 1891, when he was made Chief Rate Clerk for the Through Freight Agent. Four years later he was appointed Chief Clerk in the General Freight Agent's office and in 1896 was appointed Acting Division Freight Agent of the United Railroads of New Jersey, assuming the full title in 1897. Mr. Drayton was appointed to the position he now leaves, that of Division Freight Agent of the Northern Central, in 1899.

—Mr. E. L. Somers, who on June 1 went from Chicago to Boston to become Freight Traffic Manager of the New York, New Haven & Hartford, had he remained in his former position until next September (General Western Freight Agent of the New York Central & Hudson River) would have completed 28 years' service with the Vanderbilt System. Mr. Somers began as Western agent of the Commercial Express Fast Freight Line, which operated over the Michigan Central, the Grand Trunk and the Erie Railroads. He was afterwards promoted to a similar position with the Erie & North Shore Despatch Freight Line. After the consolidation of the Canada Southern Line with the Blue Line, Mr. Somers became joint representative of these two lines at Chicago. In 1893 he was appointed General Western Freight Agent of the West Shore, and in February, 1901, was made General Western Freight Agent of the New York Central also, which position he has held up to the first of the present month.

—Mr. Joseph T. Richards, whose promotion to be Chief Engineer of Maintenance of Way of the Pennsylvania Railroad, was recently announced, was born in 1845 in Cecil County, Md. He entered the company's service in 1869 as a rodman. From 1870 to 1871 he was Supervisor on the main line and for the next two years was Chief Engineer of Construction and Superintendent of various minor railroads in Maryland. In 1875 he was with the Cambria Iron Company, Johnstown, Pa., as a civil and mining engineer, and later Principal Assistant Engineer of Maintenance of Way of the United Railroads of New Jersey Division of the Pennsylvania. In 1883 he was made Assistant to the Chief Engineer; in 1885 Assistant Chief Engineer, and in 1893, Engineer of Maintenance of Way. His authority extends to all lines east of Pittsburg, Erie and Buffalo.



—Mr. James B. Houston, formerly President of the Pacific Mail Steamship Company for many years, died at his home in New York City May 28, at the age of 64.

—The new General Superintendent of Motive Power of the Baltimore & Ohio, Mr. John E. Muhlfeld, was formerly with the Intercolonial Railway as Superintendent of Machinery and Rolling Stock. Mr. Muhlfeld has had varied experiences in the shops and in subordinate mechanical positions. He was born at Peru, Ind., in 1872. He spent one summer vacation as Assistant to the Engineer in charge of construction work on the Peru & Detroit, and two summers as machinist apprentice in the Fort Wayne shops of the Wabash. He later returned to the Fort Wayne shops, serving as machinist until 1894, and was a locomotive fireman until November, 1894. He was then appointed roundhouse foreman of the Wabash, and in March, 1898, when the new Wabash line was opened between Detroit and Buffalo, Mr. Muhlfeld was made General Foreman at St. Thomas, Ont. In 1899, he left the Wabash to become Master Mechanic of the Grand Trunk at Port Huron, Mich., and two years later was transferred to the Montreal shops, from which position he resigned to go to the Intercolonial. He was later appointed Superintendent of Motive Power at Newark, Ohio, for the Baltimore & Ohio, which position he now resigns to succeed Mr. Casanave.

—Mr. Edward A. Chenery, who has succeeded Mr. Hammond as Superintendent of Telegraph of the Missouri Pacific, is 44 years old and was born on the Atlantic Ocean. His railroad service dates from 1872, when he entered the service of the Grand Rapids & Indiana as a telegraph operator. Then for seven years he was with the Galveston, Harrisburg & San Antonio. For a few months, in 1886, Mr. Chenery was Secretary to the General Superintendent of the Union Pacific. In January, 1887, he was appointed Superintendent of Telegraph of the Terminal Association of St. Louis. Mr. Chenery has been Secretary of the St. Louis Railway Club since 1899, and in January, this year, was elected Secretary of the St. Louis Division of the Central Association of Railroad Officers.

—Mr. Archibald S. Baldwin, the new Engineer of Construction of the Illinois Central, is a native of Virginia. He was born at Winchester in 1861, and entered railroad service at the age of 18 years as a rodman for the Richmond & Alleghany, now the Chesapeake & Ohio. For two years (1880-1882) he was Assistant Engineer and Engineer of the Iron & Steel Works Association of Virginia. In the latter year he went to the Baltimore & Ohio as Draughtsman and Engineer and was with this company three years. He then became Principal Assistant Engineer on the Chicago, Milwaukee & St. Paul. In 1887 he was Resident Engineer of the Louisville, St. Louis & Texas, and in October, 1901, entered the service of the Illinois Central as Principal Assistant Engineer, from which position he has just been promoted.

—Mr. Isaac S. Lauck, Auditor of Disbursements of the Atchison, Topeka & Santa Fe, whose home was in Topeka, died suddenly in Chicago May 27, at the Grand Pacific Hotel. Mr. Lauck was born at Georgetown, D. C., in 1845 and was educated at the college in that city. He started his railroad service with the Hannibal & St. Joseph in 1870, and his service with the Atchison dates from 1872, when he began as station clerk and cashier.

—Mr. John B. Thayer, Jr., who on the first of this month became Fifth Vice-President of the Pennsylvania Railroad, is promoted from the position of General Freight Agent. Mr. Thayer was born in Philadelphia in 1862. After leaving the University of Pennsylvania in 1881, he entered the service of the Pennsylvania as a clerk in the Empire Line Office, but was later transferred to the general freight department, serving two years in the bureau of claims, and for some months in the rate department. Upon the reorganization of the freight department, with Mr. J. S. Wilson as General Freight Traffic Agent, Mr. Thayer was appointed Chief Clerk. Three years later he was appointed Freight Solicitor on the United Railroads of New Jersey Division. In 1889, he left the service of the company and engaged in commercial pursuits, but returned to railroading in 1892, as Division Freight Agent of the Northern Central at Baltimore. In 1894, he was made Assistant General Freight Agent at Philadelphia; in 1897, General Freight Agent in charge of through traffic, and in 1899, he was advanced to the position of General Freight Agent of the Pennsylvania.

—Mr. Charles Miller Sheaffer, who on the first of this month became Superintendent of Passenger Transportation of the Pennsylvania Railroad, was born in Pittsburg, Pa., in 1858. Mr. Sheaffer entered the service of the Pennsylvania in 1877, as messenger in the Superintendent's office of the Pittsburgh Division, and has been in continuous service of the company ever since, serving as messenger, telegraph operator, yardmaster, train despatcher and Superintendent of Telegraph.

—Mr. Josiah C. Bartlett, Superintendent of the Relief Department of the Chicago, Burlington & Quincy, died recently. Mr. Bartlett was a well known Burlington officer. He was graduated from Harvard in the class of 1869. He was born in South Berwick, Me., in 1846, and began his railroad service in 1888 as Assistant to the President of the Burlington. He was made Superintendent for the Relief Department in 1889.

ELECTIONS AND APPOINTMENTS.

Atchison, Topeka & Santa Fe (Coast Lines).—F. P. Barnes, Master Mechanic, with headquarters at Albuquerque, N. Mex., has resigned.

Baltimore & Ohio.—J. E. Muhlfeld, heretofore Superintendent of Motive Power at Newark, Ohio, has been appointed General Superintendent of Motive Power, with headquarters at Baltimore, Md., succeeding F. D. Casanave. G. A. Schmoll has been appointed to succeed Mr. Muhlfeld at Newark and C. T. Turner, heretofore General Foreman, has been appointed to succeed Mr. Schmoll as Master Mechanic at Mt. Clare. C. J. DeVilbies has been appointed Master Mechanic at Newark, Ohio, succeeding J. W. Dalman and G. F. Hess succeeds Mr. De Vilbies as Master Mechanic at Cleveland. J. D. Harris, Assistant to the General Superintendent of Motive Power, has resigned.

A new division comprising the line between Butler and Kane, Pa., to be known as the Butler Division, has been created, and J. A. Spielmann, Division Engineer at Garrett, Ind., will be in charge as Superintendent, with headquarters at Foxburg, Pa.

Birmingham & Atlantic.—W. L. Law, Superintendent, with headquarters at Talladega, Ala., has resigned.

Canadian Pacific.—J. Manson has been appointed to succeed Mr. Price as Superintendent of the Ontario Division, with headquarters at Toronto, Ont. G. Spencer has been appointed Superintendent to succeed Mr. Manson and D. G. Ross has been appointed to succeed

Mr. Downie as Superintendent of the Pacific Division, with offices at Nelson, B. C.

Chicago, Burlington & Quincy.—W. L. Barnes has been appointed Acting Superintendent of Car Service, with headquarters at Chicago. E. Valentine, Northwestern Passenger Agent, with office at St. Paul, Minn., has resigned.

Chicago & North Western.—E. B. Thompson, heretofore Master Mechanic at Mason City, Iowa, has been appointed Master Mechanic at Winona, Minn., succeeding W. Hutchinson.

Chicago, Rock Island & Pacific.—J. E. Loy has been appointed Master Mechanic at Valley Junction, Iowa, succeeding D. W. Cunningham.

Ft. Worth & Denver City.—H. C. Van Buskirk has been appointed General Master Mechanic, with headquarters at Childress, Texas, succeeding Milton Player, Master Mechanic.

Frankfort & Cincinnati.—S. E. Hutton has been appointed General Freight and Passenger Agent, with headquarters at Frankfort, Ky., succeeding D. W. Lindsey, Jr., who has been assigned to other duties.

International & Great Northern.—W. C. Rigsby has been appointed Assistant General Freight Agent, with office at San Antonio, succeeding Homer Eads, who has been appointed Assistant to the Second Vice-President and General Manager, with the title of Superintendent of Car Service, at Palestine, Texas.

Long Island.—W. H. Drayton, Jr., has been appointed General Freight Agent, with headquarters at New York City, succeeding W. J. Rose, who has resigned to become Division Freight Agent at Harrisburg, Pa., for the Pennsylvania R. R.

National R. R. of Mexico.—Gaston C. Raoul having resigned as Purchasing Agent, the duties of that office will until further notice be discharged by William Burckel, Secretary.

Nebraska, Kansas & Gulf.—G. F. Wolfe has been appointed Traffic Manager and Assistant to the President, with headquarters at Salina, Kan.

New York, New Haven & Hartford.—E. P. Dawley, heretofore Division Engineer (Eastern District) has been appointed Assistant to the Chief Engineer, with headquarters at Boston, Mass.

Pennsylvania.—W. B. McCaleb has been appointed Superintendent of the Philadelphia Division, succeeding Thomas Gucker, who has become Special Agent. C. A. Preston has been appointed Superintendent of the Middle Division, succeeding Mr. McCaleb and H. P. Lincoln succeeds Mr. Preston as Superintendent of the Eastern Division of the Philadelphia & Erie Railroad Division.

See Long Island.

Pennsylvania Company.—W. H. Potter, Superintendent (North West System), with headquarters at Toledo, Ohio, has resigned.

St. Louis & North Arkansas.—J. P. Dolan has been appointed Master Mechanic, with headquarters at Eureka Springs, Ark., succeeding W. S. Lawless, resigned.

San Francisco & Eureka.—The officers of this company are: President, A. W. Foster; Vice-President, P. N. Lilienthal; Secretary, T. Mellersh, and Cashier, G. C. Hickox.

LOCOMOTIVE BUILDING.

The Barney & Smith Car Co. is having one locomotive built at the H. K. Porter Works.

The Chicago, Milwaukee & St. Paul is having 17 locomotives built at the Baldwin Works.

The Louisville, Henderson & St. Louis is having two locomotives built at the Pittsburg Works of the American Locomotive Co.

The Vandalia has ordered 17 locomotives from the American Locomotive Co. Consolidated steam heat equipment will be used.

F. M. Hicks, of the Hicks Locomotive & Car Works, has sold one 50-ton freight locomotive to the Trinity & Brazos Valley. An order has also been placed for one six-wheel switching engine for the German-American Lumber Co.

The New York, Ontario & Western, as reported in our issue of May 8, has ordered three simple consolidation (2-8-0), and three mogul (2-6-0) locomotives from the American Locomotive Co., for December, 1903, and March, 1904, delivery. The 2-8-0 locomotives will weigh 200,000 lbs., with 178,000 lbs. on drivers. Cylinders, 21 in. x 32 in.; wide fire-box boiler with a working steam pressure of 200 lbs.; heating surface, 3,285 sq. ft.; 356 Tyler charcoal tubes, 2¼ in. in diameter and 14 ft. 9 in. long; carbon steel fire-box, 119½ in. long and 105 in. wide; grate area, 87½ ft.; tank capacity, 6,000 gal.; coal capacity, nine tons. The 2-6-0 locomotives will weigh 150,000 lbs., with 130,000 lbs. on drivers; cylinders, 19 in. x 26 in.; wide fire-box boiler, with a working steam pressure of 200 lbs.; heating surface, 1,754 sq. ft.; 247 tubes, 2 in. in diameter and 12 ft. 8½ in. long; fire-box, 120 in. long and 96 in. wide; grate area, 80 ft.; tank capacity, 5,000 gal.; coal capacity, nine tons. The special equipment for both includes Westinghouse-American air-brakes, open-hearth steel axles, Sansom's bell ringer, magnesia sectional boiler lagging, Sterlingworth or Simplex brake-beams, Gould couplers, Star headlights, No. 9 Monitor injectors on the 2-6-0 locomotives, and No. 10 injectors on the 2-8-0 locomotives, Leach sanding devices, Nathan triple sight-feed lubricators, Railway Steel Spring Co.'s springs, Gold heating system, U. S. piston rod and valve rod packings on the 2-8-0 locomotives, and Excelsior piston rod and valve rod packings on the 2-6-0 locomotives, cast-steel wheel centers, Davis counterbalance, Chambers compensating throttle, Robinson exhaust pipes, check valve and stop-cock, Midvale driving wheel tires, McKee-Fuller 30-in. steel tired spoke truck wheel, and 33-in. cast-iron tender wheels.

CAR BUILDING.

Geo. W. Wilson is in the market for 35 ice cars.

The Mexican International is figuring on additional freight equipment.

The American Car & Foundry Co. has miscellaneous orders for five cars.

The Canadian Pacific has ordered 300 freights from J. W. Ellsworth & Co.

The Carnegie Steel Co. has ordered three steel flat cars from the American Car & Foundry Co.

The Evansville & Terre Haute has ordered 100 coal cars from the American Car & Foundry Co.

The Chicago, Rock Island & Pacific is reported to be about to build 400 box cars at its own shops.

The Western Maryland is reported to be asking estimates on 300 steel hopper cars, 200 gondolas and 200 box cars.

The Denver, Northwestern & Pacific has ordered 50 flat cars of 60,000 lbs. capacity, to be built at the Barney & Smith Works.

The National R. R. of Mexico has ordered 500 cars from the South Atlantic Car & Mfg. Co. This company is now building a car works at Waycross, Ga., which, it is reported, will be completed by July 15.

F. M. Hicks, of the Hicks Locomotive & Car Works, has sold 100 flat cars to the Cuba Company; 25 flat, and 10 box cars to the Coeur d'Alene & Spokane; 15 flat cars to the Nash Lumber Co. An order has also been placed by the Butte, Anaconda & Pacific for rebuilding one baggage car.

The Atchison, Topeka & Santa Fe, as reported in our issue of May 29, has ordered 300 furniture cars of 60,000 lbs. capacity from the Terre Haute Works of the American Car & Foundry Co. The cars will be 40 ft. long, 9 ft. wide and 10 ft. high, all inside measurements. The special equipment includes: M. C. B. axles and brake-shoes, Westinghouse air-brakes, M. C. B. brasses, A., T. & S. F. standard door fastenings, Security doors, Miner draft rigging and McCord malleable journal boxes and lids.

The Missouri, Kansas & Texas is in the market for 25 coaches and 15 chair cars. The coaches will be 68 ft. long, and 9 ft. 8 in. wide, over sills, and 6 ft. 8 in. high from sill to plate, with wooden frames and underframes. The chair cars will be 70 ft. long and 10 ft. wide over sills, and 6 ft. 8 in. high from sill to plate, with wooden frames and underframes. Special equipment for both includes standard M. C. B. axles, 4¼ in. x 8 in. journals; M., K. & T. standard bolsters, door fastenings, doors and paint; National hollow brake-beams, standard (Diamond S) brake-shoes, Westinghouse brakes, solid lead-lined brasses, Janney couplers, Burrowes curtain fixtures, Pantasote curtain material, Safety Car Heating & Lighting Co.'s heating system, Symington dust guards, journal boxes and journal box lids, Pintsch gas, American Car & Foundry Co.'s steel platforms, six-wheel trucks, Pullman wide vestibules, and duplex elliptical springs.

BRIDGE BUILDING.

AMHERSTBURG, ONT.—The Railway Committee of the Canadian Parliament has agreed to a bill incorporating the Pere Marquette International Bridge Co., which proposes to build a bridge over Detroit River at this place.

ATLANTA, GA.—The Council is considering a $75,000 bridge over the Southern Ry. tracks on Edgewood avenue, and has voted to appropriate $15,000 toward the cost of beginning the substructure.

BATH, ME.—The Merrymeeting Bay bridge may be rebuilt.

BRYAN, OHIO.—The County Auditor will receive bids until June 6 for substructure for six bridges.

BOUND BROOK, N. J.—The freeholders have decided to build an arch bridge, 50 ft. long, over the brook on Windsor street, between High street and Union avenue.

BURLINGTON, IOWA.—The City Clerk will receive bids until 4 p.m., June 15, for the Sixth street viaduct between Valley and Jefferson streets. Emmet Steece, City Engineer, has the plans and specifications.

CANASTOTA, N. Y.—It is reported that $10,000 has been voted for an arch bridge over Canastota Creek.

CLARK SUMMIT, PA.—The courts have been petitioned for a county bridge on Center street.

CLEVELAND, OHIO.—It is said that bids will be received until July 1 for a 160-ft. rolling liftbridge over Cuyahoga River, to be built for the Newburg & South Shore Ry. Co.

COLORADO, TEXAS—A new steel bridge is proposed over Colorado River.

CUMBERLAND, MD.—The County Commissioners are considering the project of a new bridge over Potomac River, to be placed on the present abutments of the Blue bridge.

DURHAM, KAN.—J. H. Thrasher, County Clerk, Marion, Kan., will receive bids until June 22 for a 100-ft. steel bridge over Cottonwood River.

EAST LIVERPOOL, OHIO.—Plans have been made for a 1,600-ft. bridge, with 800-ft. channel span, to connect the west end of this city with Newell, W. Va.

EDMONTON, ALBERTA.—The Canadian Pacific Ry. as a condition of obtaining an entry into Edmonton, has offered to build a new bridge across Saskatchewan River at a cost of $275,000.

EVERETT, WASH.—The City Engineer is preparing plans for a bridge over Snohomish River at Harrison and California streets, to consist of two 150-ft. spans and a 233-ft. draw, with concrete piers.

GALVESTON, TEXAS.—It is reported that various railroads are considering the building of a double track railroad and wagon bridge across the bay to connect Galveston island with the mainland.

GIBSON, N. Y.—The Supervisors of Steuben County have authorized the town of Gibson to borrow $10,000 for a new bridge.

HILLSBORO, N. DAK.—Bids are said to be wanted June 16 for several bridges to be built by Traill County.

JACKSONVILLE, FLA.—It is announced that the contract for the Bridge street viaduct has been given to Shailer & McCormick, Boston, Mass., for $165,000.

KANSAS CITY, MO.—Five important bridges in this city were destroyed by the flood of May 30.

KENEWICK, WASH.—The County Commissioners may build a new bridge over Yakima River.

KENSINGTON, CONN.—The wooden bridge over the main line of the New Haven R. R., on the road to Berlin Center, has been damaged by fire, and a steel bridge may be built in its place.

KINGSTON, R. I.—The question is being considered of a $75,000 bridge over Wickford River.

MILWAUKEE, WIS.—It is reported that the Chicago, Milwaukee & St. Paul will build a bridge over Milwaukee River to cost about $100,000.

MISSOULA, MONT.—The City Council is considering the project of building another bridge over Missoula River, in response to a petition from residents of the East Side.

MUNCIE, IND.—It is said that $18,000 has been appropriated for a bridge over White River at Delaware street.

NEWARK, OHIO.—The county will decide June 8 on the question of a bridge over Licking River at Orchard street.

NEW YORK, N. Y.—The Board of Estimate & Apportionment has appropriated $22,000 for a new bridge at Seeley street, Brooklyn, to connect two streets in Windsor Terrace.

Commissioner Lindenthal is said to have ordered plans to be drawn for two new bridges over Harlem River. One will replace the present Madison avenue bridge, and the other will cross the river at Fordham Heights.

OAKLAND, CAL.—The County Commissioners will spend $10,000 on two bridges to be built over San Leandro and Tassajara creeks.

PALMER, MASS.—John O. Hamilton, chairman of the committee on new bridges, will receive bids until 2 p.m., June 12, for a steel bridge and abutments over Quaboag River, near Burleigh's crossing, and a stone arch bridge over Ware River near the No. 1 mill in Thorndike.

PHOENIXVILLE, PA.—The Montgomery & Chester Electric Ry. is said to be having plans prepared for a steel bridge.

PILLAGER, MINN.—It is reported that $15,000 bonds will be issued for a bridge over Crow Wing River.

PORTLAND, ORE.—The Council has established a bridge district from which to raise money by taxation for the proposed steel bridge over Marquam Gulch at First street.

SHREVEPORT, LA.—Bids will be opened June 18 for a 160-ft. bridge over Dooley Bayou, in Ward 1, of Caddo Parish; a 150-ft. bridge at Hales Ferry, between Wards 1 and 2, and a 200-ft. bridge over Red Bayou, in Ward 1, at Gilliam. P. P. Keith, President; A. L. Duringer, Clerk.

SOUTH ROYALTON, VT.—The town of Royalton has voted to build a 200-ft. steel bridge over White River.

TORRESDALE, PA.—The Grand Jury of Bucks County has recommended a bridge over Poquessing Creek, to be built at the joint expense of the county, the state, and the city of Philadelphia.

WAGONER, IND. T.—The Arkansas bridge over the Arkansas River was recently carried away by high water.

WESTPORT, MASS.—Estimates are being prepared of the cost of a new bridge at Westport Point.

YONKERS, N. Y.—H. Fernstrom, Chief Engineer, Grand Central Station, New York, will receive bids until 3 p.m., June 8, for a through plate girder steel highway bridge, to carry Caryl avenue over the tracks of the Putnam branch of the N. Y. C. & H. R. R. R.

Other Structures.

BATTLE CREEK, MICH.—It is said that the Grand Trunk will build a new passenger station.

BERKELEY, CAL.—The Santa Fe is said to have purchased a site for a passenger station and yards on Valley street.

DALLAS, TEXAS.—An officer of the Dallas Terminal Ry. & Union Depot Co. is said to have announced that the company will be reorganized, with ample capital, which will be spent in building a union station, and in bringing together into one locality the freight business of the roads centering at Dallas.

FAIRMONT, W. VA.—The Fairmont Steel & Iron Co., recently organized, will build a mill for the manufacture of small steel rails.

FARGO, N. DAK.—The Great Northern will build a 400 ft.x50 ft. freighthouse.

HAMILTON, ONT.—The Canadian Iron & Foundry Co. has purchased 22 acres of land on which it will build a new plant, with main building 250 ft.x125 ft.

HARRISBURG, PA.—Two boiler plate mills of the Central Iron & Steel Co. have been destroyed by fire.

The Harrisburg Boiler & Mfg. Co. has increased its capital stock by $50,000 for the purpose of enlarging its shops.

LA CROSSE, WIS.—The Green Bay & Western is said to have made plans for a new depot and roundhouse.

LAKE BLUFF, ILL.—The Chicago & North Western R. R. and the Chicago & Milwaukee Electric Ry. will build a union depot.

PITTSBURG, PA.—It is reported that the Crucible Steel Co. of America will modernize its Pittsburg plant at a cost of nearly $3,000,000.

RIDGEWAY, PA.—The Ridgeway Machine Tool Co., recently organized, is having plans prepared for new shops.

ROCHESTER, N. Y.—The Eureka Foundry Co. will erect new shops with modern equipment, for making heavy machinery casting.

PASCO, WASH.—It is reported that the Northern Pacific will build a $50,000 passenger depot.

SYRACUSE, N. Y.—The Hyle Bros. Steel Tool Co. has chosen a site for a $75,000 plant in the eastern part of this city.

TEXAS CITY, TEXAS.—The Texas City Terminal Railroad Co. will build a steel elevator with capacity of 500,000 bushels, a 120x500 ft. pier and two warehouses.

WINONA, IND.—A $25,000 passenger station will be built for the use of the Pittsburg, Cincinnati, Chicago & St. Louis R. R. and the Winona-Warsaw Electric Line.

RAILROAD CONSTRUCTION.

New Incorporations, Surveys, Etc.

ALABAMA-TENNESSEE IRON & R. R.—This company has been incorporated, with a capital stock of $2,500,000, to acquire mines and build railroads. J. R. Hunter and F. R. McDermott, of Jersey City, are incorporators.

ALASKA CENTRAL.—Contract is reported let to the Northwest Construction Co. for building the first 25 miles of this proposed road from Resurrection Bay, Alaska, north via Lake Kenai and Cariboo Pass, to Atwood, on the Tanana River. Geo. Dickinson, Tacoma, Wash., is President and General Manager. (March 27, p. 239.)

ALLEGHENY & WESTERN CONNECTING.—It is reported that contracts have been let for grading the first five miles of this road from a point near Harmarville, Pa., to a point on the Pittsburgh & Western near Gibsonia, Pa. W. E. Fohl, of Pittsburg, Pa., is President. (See Construction Supplement.)

ATCHISON, TOPEKA & SANTA FE.—An officer writes that this company will build a line from Havana, Kan., south to Caney, six miles. The track of the Missouri Pacific between these points has been used by the Atchison, but the new cut-off will shorten the distance four miles. Contracts for grading will be let at once. Track laying and bridging will be done by the company's own forces. (May 22, p. 367.)

With regard to the recent flood at Kansas City, President E. P. Ripley of the Atchison, Topeka & Santa Fe says: Our road has lost no bridges and practically no track, and we are running up to Kansas City but not through it. It is impossible to estimate our loss at present, but it may be $100,000. Damage to crops is not serious, as there is but little wheat planted in the lowlands.

BIRMINGHAM & ATLANTA AIR LINE.—Articles of consolidation of the East & West R. R., and the Chattahoochee Terminal, have been filed with the Secretary of State of Alabama, under the name of the Birmingham & Atlanta Air Line. The East & West is the successor of the East & West of Alabama. The road extends from Birmingham, Ala., northeast to Cartersville, Ga. The Chattahooche Terminal was chartered for the purpose of building a line from Atlanta to a point near Marietta. Both of these roads are controlled by the Seaboard Air Line, and it is said that it is the purpose to form a through line from Atlanta by way of Marietta to Birmingham.

BRUCE MINES & ALGOMA.—An amendment to the charter of this company has been passed by the Ontario Government providing for the extension of the line to a point on the Canadian Pacific between Chapleau and Biscotasine. An extension is also authorized from Rock Lake, Ont., the present charter terminus, to a point on James Bay. John McKay, Sault Ste. Marie, is interested. (See Construction Supplement.)

BUFFALO, ROCHESTER & PITTSBURG.—Surveys have been finished for the proposed branch of this road from Creek Side to Whiskey Run, Pa., 17 miles. Contract is reported let to F. H. Clement & Co., Philadelphia.

CALCASIEU & GREAT NORTHERN.—Surveys are reported completed for this proposed road from Lake Charles, La., north to a point on the Texas & Pacific. J. T. Shutts, Lake Charles, La., is engineer in charge of the work.

CALIFORNIA NORTHWESTERN.—With regard to the recent rumors that the Southern Pacific has purchased the California Northwestern, the San Francisco *Examiner* has the following to say: In spite of all stories to the contrary, Mr. Foster has not parted with the control of this road. He has been obtaining rights of way north toward Eureka, and has been perfecting arrangements for a bond issue. The 180-mile gap between Willits and Eureka will cost between $6,000,000 and $7,000,000. Whether he has arranged to give the Southern Pacific trackage rights over his line is not known.

CANADIAN NORTHERN.—The Dominion Government has decided to guarantee the bonds of this railroad to the extent of $13,000 a mile, on 500 miles of the line from Grand View, Man., to Edmonton, taking as security a first mortgage on the line. Work is now in progress in a westerly direction, from the end of the grade reached in 1902, about 38 miles out of Grand View, and easterly from Edmonton to Fort Saskatchewan. The Canadian Bridge Co., Walkerville, Ont., has the contract for all the bridges.

CANADIAN PACIFIC.—Work will be begun very shortly on a large number of new sidings between Winnipeg and Regina, and between Brandon and Kemnay. J. D. McArthur has been awarded a contract for grading 54 miles of the Yorkton extension. The Canadian Construction Co., Montreal, has been awarded the contract for grading the line between North Bay and Sudbury. Work will be begun at once. (Official.)

CARIBOO, WASHBURN & PERHAM (ELECTRIC).—Articles of incorporation have been filed by this company in Maine. The proposed route is through Washburn, Perham and Woodland, 15 miles. S. L. White is President; J. D. Emery, Vice-President. Work will be begun shortly.

CAROLINA & NORTHWESTERN.—Press reports state that this company is about to build an extension from Freeland, N. C., to the top of Blue Ridge Mountains, 45 miles. Surveys have been finished and contracts for grading part of the line will be let about July 1. J. R. Ervin, Lenoir, N. C., is Chief Engineer.

CHERAW & BENNETTSVILLE.—Press reports state that the grading on this line from Bennettsville, S. C., to a connection with the Seaboard Air Line at Kollock, 14 miles, is practically completed. It is stated that the Seaboard will equip and operate the road. J. A. Drake, Bennettsville, S. C., is President. (See Construction Supplement.)

CHICAGO, BURLINGTON & QUINCY.—It is stated that this company is ready to receive bids for building the proposed extension from Ashland, Neb., northeast to Sioux City, Iowa, about 100 miles. Rights of way have been secured and surveys finished. (May 8, p. 335).

CHICAGO GREAT WESTERN.—See Des Moines & Southern, under Railroad News.

CHICAGO, MILWAUKEE & ST. PAUL.—This company has temporarily abandoned the work of double tracking its line between Dubuque, Iowa, and La Crosse, Wis., and will not resume it until both labor and material become cheaper. The principal double tracking was on the La Crosse Division. Half of this was to have been done during the current fiscal year. (See Construction Supplement.)

COLUMBUS, MARSHALL & NORTHEASTERN.—Contract has been awarded to John Seymour, Hudson, Mich., for building 42 miles of this line between Marshall and Olivet, Mich. Work will be begun at once, as the contract calls for the completion of the line by Oct. 1, 1903.

CURWENSVILLE & BOWER (NEW YORK CENTRAL).—A contract has been let for grading this line from a point on the Clearfield & Mahoning near Curwensville, to Bower, Clearfield County, Pa., 16 miles. This is on the Pennsylvania Division of the New York Central & Hudson River, in the county of Clearfield. (May 1, p. 320).

DECATUR, SPRINGFIELD & ST. LOUIS (ELECTRIC).—Articles of incorporation have been filed by this company to build an electric line from Decatur, Ill., west to Springfield, and thence south to East St. Louis, 110 miles. The company is reported to be financed by a Montreal insurance company. No names are given.

DENVER, NORTHWESTERN & PACIFIC.—Press reports state that the Colorado-Utah construction company which is building this road is about to let contracts for a 2¼-mile tunnel through the main range, and for a temporary line which will be built around the mountains across Rollinsville Pass.

DES MOINES & SOUTHERN.—See Railroad News.

FLAT TOP.—This company has been incorporated in West Virginia, to build from Raleigh to Bramwell, 35 miles. C. E. Hawkins, Fairmont; P. G. Walker, Charleston, and others, are incorporators.

HURON & MICHIGAN (ELECTRIC).—Incorporation has been granted this company to build an electric line from Grand Rapids, Mich., northeast through the Counties of Kent, Ionia, Montcalm and Gratiot to Saginaw, about 100 miles. The company is capitalized at $2,300,000. L. J. Hanes, H. W. Lake, A. D. Prosser and others, of Saginaw, are interested.

INTERSTATE TRACTION.—This company has been incorporated in Ohio, to build an electric railroad from Dayton west to Indianapolis, 110 miles, through the Counties of Montgomery and Preble in Ohio, and the Counties of Union, Fayette, Rush and others in Indiana. G. W. Woodman and E. R. Phillips are incorporators.

JACKSONVILLE & SPRINGFIELD TRACTION.—A charter has been granted this company to build and operate an electric line from Jacksonville, Ill., east to Springfield, 30 miles, with branches to Berlin and New Berlin, in Sangamon County. J. Y. Kelly, Springfield, Ill., is said to be interested.

KOOTENAY, CARIBOU & PACIFIC.—A bill has recently passed the British Columbia Legislature granting incorporation to this road. The proposed route is from Golden, B. C., northwest to Fort George, on the Fraser River. Harvey & McCarter, Fort Steele, B. C., are said to be interested. (See Construction Supplement.)

LOS ANGELES, DAGGETT & TONOPAH.—The California-Nevada Construction Co. has recently been incorporated in California to build this line from Daggett, Cal., to Tonopah, Nev., 235 miles. It is reported that work will start in 30 days. The character of the work is light, with very few bridges and no tunnels. J. Irving Crowell, Los Angeles, Cal., is President, and H. W. Griswold, 120 Sutter street, San Francisco, Chief Engineer. (April 24, p. 304.)

MAYSVILLE & MOUNT OLIVET TRACTION.—This company has been organized to build an electric line from Maysville, Ky., to Mount Olivet, 18 miles. J. W. Duly is President, and E. Kenton, of Mount Olivet, Vice-President.

MINNESOTA CENTRAL.—A charter has been granted this company in New Jersey, to build and operate a line from Albert Lea, Freeborn County, Minn., northwest through the Counties of Blue Earth, Sibley, McLeod and Meeker to a point on Lake Superior. C. H. Mackenzie, Gaylord, Minn., and H. B. Cady, Minneapolis, are incorporators.

MISSOURI CENTRAL (ELECTRIC).—It is reported that about 90 per cent. of the right of way for this new road has been secured. The proposed route is from Brookfield, in Linn County, Mo., to Cuivre Junction, in St. Charles County, 194 miles. Bids for grading are now being asked. W. B. Cauthorn, Columbia, Mo., is Chief Engineer, and G. B. Harrison, Glasgow, Mo., President.

NORTHERN PACIFIC.—A contract has been awarded to A. Guthrie & Co., of St. Paul, for reconstruction work on the Rocky Mountain Division of this road. It is stated that the 16 miles of reconstruction which has just been let will cost about $500,000. Change of grade and track will be made from Thornton, Wash., about four miles east of Hope, to Kootenai, 16 miles.

OHIO RIVER & COLUMBUS.—An officer writes that work is now in progress on this line from Ripley, north via Georgetown to Sardinia, 20 miles. Grading is being done by the company's own forces. W. G. Wagenhalls, 93 Perin Building, Cincinnati, Ohio, is Chief Engineer. (May 15, p. 352.)

OHIO ROADS.—The American Steel & Wire Co. has petitioned the city of Cleveland for permission to build and operate a railroad eight miles long, connecting its furnaces with its steel works at Newburg.

PENNSYLVANIA.—Contract for the Pennsylvania tunnel under Virginia avenue has been let to the Drake & Stratton Company, of Philadelphia. On account of the bids received for the two necessary tunnels in connection with the track elevation work, all of which were far above the estimates of the road, the tunnels will be of the ordinary double-track kind, instead of the two single tracks or twin tunnels as at first proposed. New bids for the tunnel under First street, S. E., have been asked and will be opened on June 8, and the modified plans have been filed with the Engineer-Commissioner of the District of Columbia.

PERE MARQUETTE.—It is reported that a contract has been let to the Marquette Construction Co. of New Jersey, for building a branch line of this company from New Buffalo, Mich., in a southerly direction through Laporte and Porter Counties, to Hammond, Ind., 45 miles. This company was recently incorporated in Indiana for the purpose of building this branch line, as under its Michigan charter the Pere Marquette has no power to build a line in Indiana. (March 20, p. 220.)

PORTLAND, VANCOUVER & YAKIMA.—Surveys are reported completed for the 12-mile extension of this road from its present terminus at Yacolt Prairie. Bids for grading will shortly be asked.

SALISBURY R. R.—This company has been incorporated in North Carolina, to build a line 100 miles long from Danbury, via Germantown and Salisbury, to connect with the Carolina Central at Monroe, Union County, N. C. The names of incorporators are not stated.

SAN PEDRO, TUCSON & GULF.—Articles of incorporation have been filed by this company in Arizona. The proposed route is from Tucson, Ariz., on the Southern Pacific, south to Port Lobos, on the Gulf of California. The road, when completed, will open up some large mining districts in Arizona and Sonora. N. O. Murphy, ex-Governor of Arizona, is said to be interested.

SOUTH CAROLINA ROADS.—The Saluda River & Lumber Co. is about to build a logging road along the old bed of the Carolina, Knoxville & Western. Surveys are reported in progress, and it is expected that track laying will be begun very soon. R. E. Johnston, Greenville, S. C., is President of the lumber company.

SOUTHERN PACIFIC.—It is officially stated that the eight narrow gage tunnels in the Santa Cruz Mountains, between Los Gatos, Cal., and Santa Cruz, are to be widened to allow for the passage of standard gage cars. Standard gage track will be made by laying a third rail. Two of the tunnels are about 6,000 ft. long each.

Work is reported practically completed on the tunnel which the Southern Pacific has been building between Montalvo, Cal., and Burbank. The tunnel is known as the Santa Suzanne, and is 7,800 ft. long. It will reduce the running time between San Francisco and Los Angeles.

SPRINGFIELD & NORTHERN.—Charter has been granted this company in Illinois, to build and operate a line from Springfield north through the Counties of Sangamon, Menard, Mason and Tazewell to Peoria, 60 miles. G. F. Fisher, W. C. Rigby, J. M. Bryant and others, of Chicago, are interested.

UNION PACIFIC.—Contract has been let to Kilpatrick Bros. & Collins, Denver, Colo., for double tracking the line from Kearney, Neb., to Silver Creek, 60 miles. A sub-contract has been let to Flaherty, Blair & Atkinson, of Denver. The work will cost about $2,000,000.

WASHINGTON & PACIFIC.—The proposed route of this road is from Orondo, Wash., via Waterville and Douglas to Buckingham, 70 miles. Surveys are now in progress and grading will be begun July 1. J. D. Atkinson, Olympia, is President. H. L. Phillips, Seattle, Wash., is Chief Engineer.

WEST VIRGINIA ROADS.—The Cardiff Coal Co. is about to build a line, 4¼ miles long, from the Powellton Branch of the Chesapeake & Ohio, to one of their mines, with about one mile of side tracks.

GENERAL RAILROAD NEWS.

AKRON-ALLIANCE CONNECTING.—A mortgage, in favor of the Eastern Trust Co. of New York for $2,000,000, has been recently filed by this company. Proceeds from the issue of bonds will be used to build an electric line from Alliance to Akron, 30 miles. A branch from Alliance to East Liverpool, 43 miles, is also proposed.

CHICAGO, ROCK ISLAND & PACIFIC.—It has been officially stated that a sufficient amount of the common stock of the St. Louis & San Francisco has been deposited with J. P. Morgan & Co. to insure the control of the 'Frisco by the Rock Island. The agreement provided for the deposit of $22,500,000 of common stock before June 1. Under the terms of the offer, for each share of common stock so deposited, there is given $60, par value, in the common stock of the Rock Island Company of New Jersey, and $60, par value, in the 5 per cent. gold bonds of 1913 of the Chicago, Rock Island & Pacific R. R. Co. (April 15, p. 352.)

CLEVELAND & SHARON TRACTION.—A mortgage has been filed by this company with the Eastern Trust Co., of New York, for $2,000,000. Five per cent. gold bonds will be issued, payable in 25 years. This company was recently incorporated to build an electric line from Middlefield, Ohio, to Sharon, Pa., with extensions to Kinsman, Ohio, and to Meadville, Pa.

DES MOINES & SOUTHERN.—F. W. Cherry, President and promoter of this proposed line from Lida, southwest through Winterset to Greenfield, Iowa, has announced that all the rights of way, franchises and property of this company have been sold to A. B. Stickney, President of the Chicago Great Western. The contracts made between the Callahan Bros. and Katz Co. of Omaha, and the Des Moines Southern for building the line have been taken over by Mr. Stickney, and grading will be begun soon.

ERIE.—A mortgage has been filed by this company with the Standard Trust Co. of New York, for $50,000,000, covering all the property belonging to the Erie R. R. on the North River, New York City. Bonds will be issued to the amount of $10,000,000 bearing 4 per cent. interest and extending over a period of 50 years. The proceeds from the sale of these bonds will be used to pay for a terminal station and ferry house at Jersey City; new ferry-boats; various improvements in grades, second track, and a large amount of rolling stock. For description of station and ferry-slip at Jersey City, see our issue of April 24, p. 296.

FORT WAYNE, LOGANSPORT, LAFAYETTE & LIMA TRACTION.—Articles of consolidation of a number of traction lines in Indiana, with $7,500,000 aggregate capital, have been filed with the Secretary of State. The new company represents the consolidation of the city lines in Lafayette and Fort Wayne, and the Logansport, Rochester & Northern, the Wabash & Logansport and the Wabash Valley & Interurban roads. The Consolidated's chief line will extend from Lafayette to Lima, via Fort Wayne, where the headquarters of the road will be established. George F. McCulloch, Indianapolis, is President; James Murdock, Lafayette, Ind., Vice-President, and S. B. Fleming, of Fort Wayne, Secretary.

INTERBOROUGH RAPID TRANSIT.—Permission has been asked of the Rapid Transit Commission by August Belmont, President of the Interborough Rapid Transit Co., New York City, to connect the viaduct section of the Subway with the Manhattan Elevated at Westchester avenue. By building a short viaduct between Brook avenue and Third avenue, track connections can be made with the Elevated line, thus facilitating travel from the Bronx to the City Hall and South Ferry by way of Second or Third avenue.

NORTHERN SECURITIES.—The United States Supreme Court has granted the motion made by Solicitor-General Hoyt to advance the case of the Northern Securities Co. for an early hearing. As the court will soon adjourn for the summer recess, it has fixed Dec. 14 as the date for the argument of the case. (May 22, p. 368.)

PENNSYLVANIA.—This company has purchased the Commercial Building at Montgomery and Greene streets, Jersey City, N. J. A terminal will be built at this point. The property is only two blocks from the yards of the Pennsylvania.

RICHMOND, FREDERICKSBURG & POTOMAC.—A mortgage for $4,000,000 has been filed by this company with the Central Trust Co. of New York. The proceeds from the sale of bonds will be used for a second main track and for making other important improvements.

ST. LOUIS & SAN FRANCISCO.—This company has secured the Beauregard, Dupont, Gueringer and other properties in San Bernard Parish, just below New Orleans, comprising about 1,000 acres. This land will be used for terminal purposes.